ESO 1726

MICROCOMPUTER SHORTCOURSE

BY

ALLAN E. LINES
DEPARTMENT OF AGRICULTURAL ECONOMICS
AND RURAL SOCIOLOGY
THE OHIO STATE UNIVERSITY

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WORKSHOP TOPICS

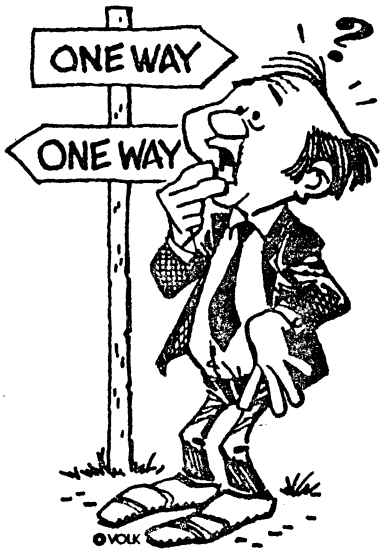
SESSION I:
- Run a computer program
- Computer hardware and how it operates
- Write a simple computer program
- Hear advice from experienced farm computer users

SESSION II:
- Review of computer hardware and computer programming
- Computer programming languages
- Write more complicated computer programs

SESSION III
- How data are stored in a computer
- The difference between memory and storage
- Farm business computer programs:
  - VISICALC
  - Data Base Management System
- Where to get farm software

SESSION IV
- Considerations in owning a computer
- Hardware needs of a farm business
- Comparison of popular computer hardware
- Computer operating costs
- Computing in the future
- Information retrieval by computer

PRACTICAL CONCEPTS OF COMPUTERS ON THE FARM



QUESTIONS TO BE ANSWERED IN THESE WORKSHOPS:

1. WHY USE A COMPUTER?

2. WHAT ARE COMPUTER PROGRAMS?

3. WHAT ARE COMPUTER PROGRAMMING LANGUAGES?

4. HOW ARE COMPUTER PROGRAMS WRITTEN?

5. WHAT JOBS CAN COMPUTERS DO WELL?

6. WHAT KIND OF COMPUTER IS NEEDED IN A FARM BUSINESS?

7. WHERE IS FARM BUSINESS COMPUTING HEADED IN THE NEAR FUTURE?

INTRODUCTION TO COMPUTING

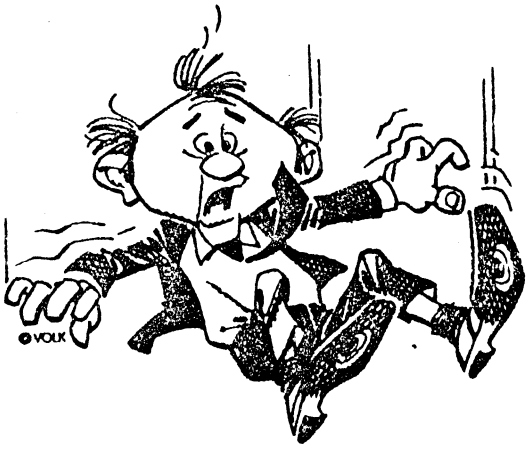
-- "HANDS-ON" USE OF A MICROCOMPUTER.

-- HOW COMPUTERS OPERATE

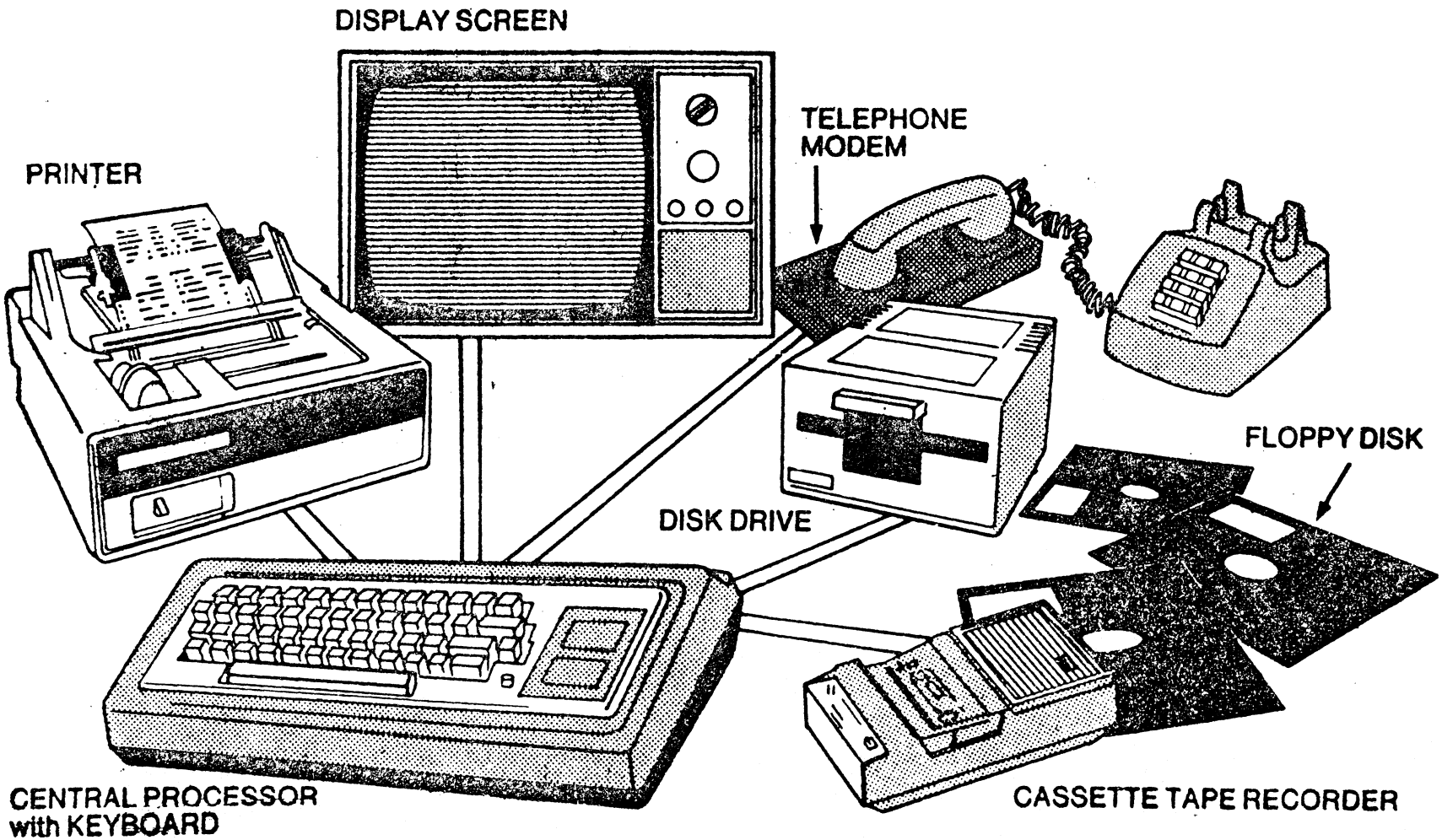
-- REASONS FOR (AND AGAINST) USING COMPUTERS

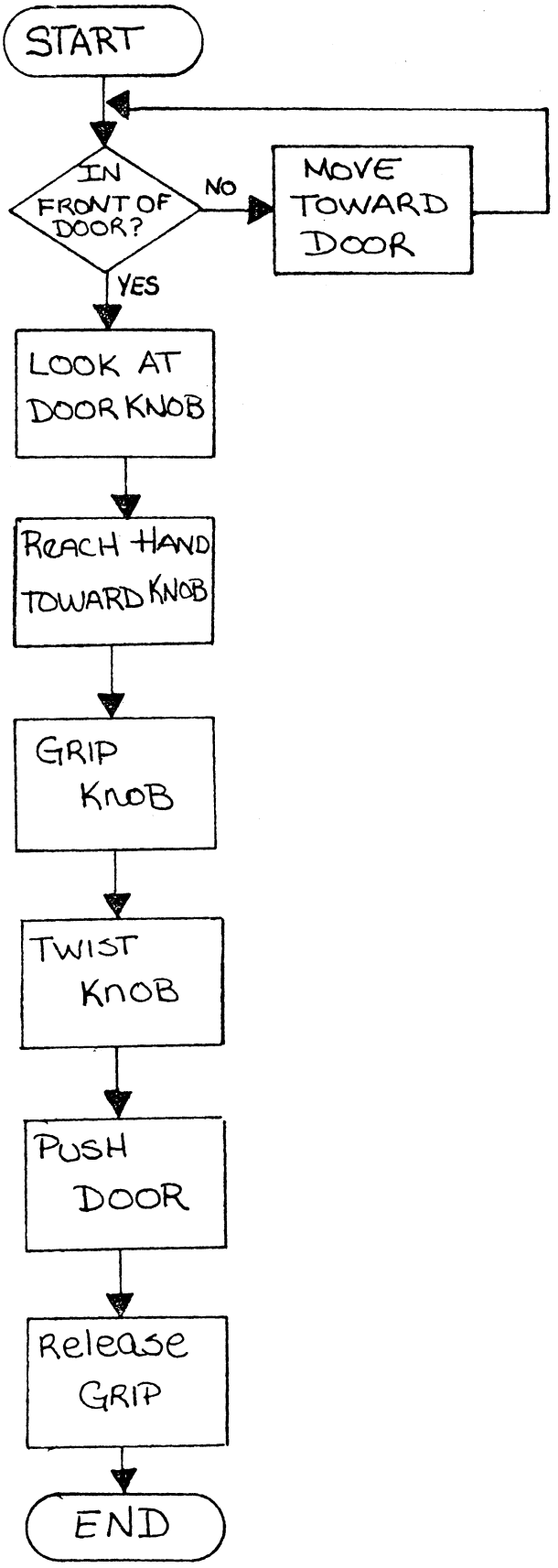
-- WRITE A COMPUTER PROGRAM

-- LEARN SOME COMPUTER TERMS



COMPUTER SYSTEM COMPONENTS




START
IN FRONT OF DOOR?
NO
MOVE TOWARD DOOR
YES
LOOK AT DOOR KNOB
REACH HAND TOWARD KNOB
GRIP KNOB
TWIST KNOB
PUSH DOOR
Release GRIP
END

COMPUTER PROGRAMMING STEPS

1. DEFINE (WRITE DOWN) THE PROBLEM --

   "WRITE A COMPUTER PROGRAM WHICH WILL COMPUTE SALES TAX ON ANY PURCHASE AMOUNT AND WILL FIND THE TOTAL OF TAX PLUS PURCHASE AMOUNT"

2. DECIDE IN DETAIL WHAT OUTPUT (RESULTS) ARE DESIRED--

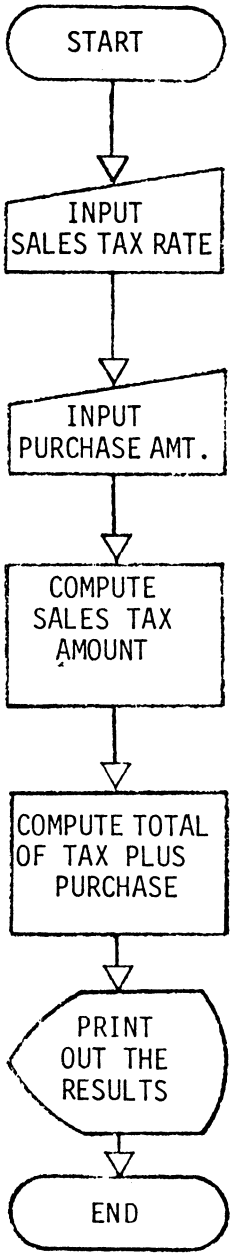
   - SALES TAX AMOUNT
   - TOTAL OF TAX PLUS PURCHASE AMOUNT

3. DETERMINE WHAT DATA WILL BE NEEDED --

   - SALES TAX RATE
   - PURCHASE AMOUNT

COMPUTER PROGRAMMING STEPS

4. FLOWCHART THE PROBLEM:



COMPUTER PROGRAMMING STEPS

5. WRITE THE COMPUTER PROGRAM:

```
10  INPUT R                    } INPUT
20  INPUT P                    }

30  T = P * R / 100            } PROCESSING
40  A = T + P                  }

50  PRINT T                    } OUTPUT
60  PRINT A                    }

70  END
```

6. "DEBUG" THE PROGRAM (FIND AND CORRECT ERRORS)

SALES TAX PROGRAM MODIFICATIONS

```
 5   PRINT "ENTER SALES TAX RATE: ø"
15   PRINT "ENTER PURCHASE PRICE: ø"

45   PRINT "SALES TAXø = ø"
55   PRINT "TOTAL AMOUNTø = ø"

65   GOTO  5

65   GOTO 15
```

INTRODUCTION TO COMPUTER PROGRAMMING

- LEARN MORE COMPUTER TERMS
- UNDERSTAND HOW COMPUTER PROGRAMS WORK
- REVIEW THE PROCESS OF WRITING A COMPUTER PROGRAM
- LEARN MORE OF THE B A S I C PROGRAMMING LANGUAGE

WHAT IS A COMPUTER PROGRAM?

?

Human Languages Cannot be used in Computers

TOO MANY WAYS TO SAY THE SAME THING:

- WRITE THE SOLUTION
- WRITE DOWN THE RESULTS
- TYPE THE ANSWER
- LIST THE RESULTS
- PRINT THE RESULTS

SO WE USE A

COMPUTER LANGUAGE

-- A SET OF CODE WORDS BY WHICH WE CAN GIVE INSTRUCTIONS TO A COMPUTER

FORTRAN LANGUAGE:

```
WRITE, A
```

BASIC LANGUAGE:

```
10 PRINT A
```

PL/I LANGUAGE:

```
PUT LIST(A)
```

Code words must be in logical order --

WRONG:

```
10  INPUT A
20  C = A + B
30  INPUT B
40  PRINT C
```

RIGHT:

```
10  INPUT A
20  INPUT B
30  C = A+B
40  PRINT C
```

CODE WORDS MUST BE ARRANGED PROPERLY

WRONG:

```
10 PRINT A GOTO 100
```

RIGHT:

```
10 PRINT A
20 GOTO 100
```

RIGHT:

```
10 PRINT "A GOTO 100"
```

COMPLETED SALES TAX PROGRAM

```
 5   PRINT "ENTER SALES TAX RATE:"
10   INPUT  R
15   PRINT "ENTER PURCHASE PRICE:"
20   INPUT  P
30   T = P*R/100
40   A = T+P
45   PRINT "SALES TAX = "
50   PRINT  T
55   PRINT "TOTAL AMOUNT = "
60   PRINT  A
65   GOTO 15
70   END
```

SALES TAX PROGRAM

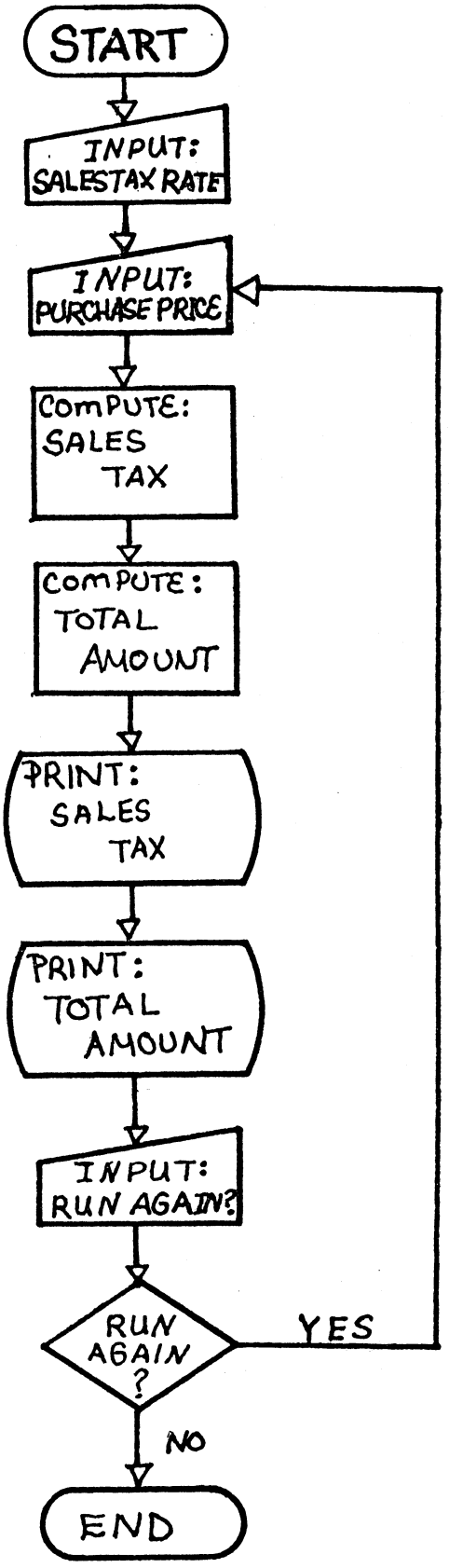
USING "IF - THEN" STATEMENT

```
 5  PRINT "ENTER SALES TAX RATE:"
10  INPUT R
15  PRINT "ENTER PURCHASE PRICE:"
20  INPUT P
30  T = P*R/100
40  A = T+P
45  PRINT "SALES TAX = "
50  PRINT T
55  PRINT "TOTAL AMOUNT = "
60  PRINT A
65  PRINT "DO YOU WANT TO RUN AGAIN?"
66  INPUT  Q$
67  IF Q$ = "YES" THEN GOTO 15
70  END
```

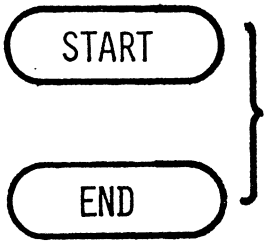
FLOW CHART

FOR

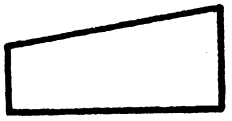
SALES TAX PROGRAM



FLOWCHART SYMBOLS

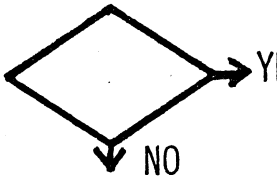


MARK THE BEGINNING OR END OF A PROGRAM

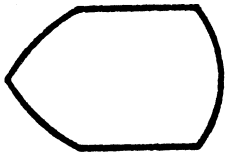


GET THE COMPUTER USER'S INPUT DATA FROM THE KEYBOARD

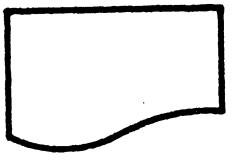
PROCESS SOME DATA



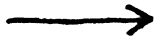
TEST SOME CONDITION (MAKE A DECISION). IF THE CONDITION IS TRUE, SEND PROGRAM CONTROL TO A DIFFERENT LINE OF THE PROGRAM



OUTPUT RESULTS OR MESSAGES TO THE CRT (DISPLAY) SCREEN



OUTPUT RESULTS TO THE PRINTER



SHOW THE DIRECTION OF PROGRAM FLOW

USING "IF . . . THEN" TO MAKE OTHER DECISIONS

Sow Culling Example

```
    .
    .
    .
70  P = L1 + L2 + L3
80  A = P / 3
90  IF A < 8 THEN PRINT "CULL THIS SOW"
    .
    .
    .
```

NOTES: (DESCRIPTION OF VARIABLES)

P = TOTAL PIGS WEANED FROM 3 LITTERS

L1, L2, L3 = PIGS WEANED FROM FIRST, SECOND, AND THIRD LITTER

A = AVERAGE NUMBER OF PIGS WEANED PER LITTER

PROGRAMS USING FOR . . . NEXT STATEMENT

PRINT 10 NUMBERS

```
10 FOR I = 1 TO 10
20 PRINT I
30 NEXT I
40 END
```

PRINT 5 ODD NUMBERS

```
10 FOR I = 1 TO 10  STEP 2
20 PRINT I
30 NEXT I
40 END
```

PRINT 5 EVEN NUMBERS

```
10 FOR I = 2 TO 10 STEP 2
20 PRINT I
30 NEXT I
40 END
```

STEPS IN WRITING A COMPUTER PROGRAM:

1. DEFINE THE PROBLEM
2. DECIDE IN DETAIL WHAT OUTPUT (RESULTS) ARE DESIRED
3. DETERMINE WHAT DATA WILL BE NEEDED
4. FLOW CHART THE PROGRAM STEPS
5. WRITE THE PROGRAM CODE WORDS ACCORDING TO THE FLOW CHART (AND TYPE THE CODE INTO THE COMPUTER)
6. "DEBUG" THE PROGRAM (GET RID OF ERRORS)

SIMPLE GRAIN YIELD PROGRAM

```
 5  PRINT "ENTER FIELD NAME"
10  INPUT F$
15  PRINT "HOW MANY ACRES IN THE FIELD"
20  INPUT A
25  PRINT "HOW MANY LOADS OF GRAIN WERE HAULED"
30  INPUT L
40  FOR I=1 TO L
45  PRINT "HOW MANY BUSHELS PER LOAD"
50  INPUT B
60  T=T+B
70  NEXT I
80  Y=T/A
90  PRINT F$
100 PRINT "TOTAL BUSHELS HARVESTED"
110 PRINT T
120 PRINT "AVERAGE YIELD ="
130 PRINT Y
140 END
```

COMPLETED GRAIN YIELD PROGRAM

```
1 CLS
2 PRINT "THIS PROGRAM COMPUTES AVERAGE GRAIN YIELD"
3 PRINT "FROM ONE FIELD (BU./ACRE)"
4 PRINT
5 PRINT "ENTER FIELD NAME"
10 INPUT F$
15 PRINT "HOW MANY ACRES IN THE FIELD"
20 INPUT A
25 PRINT "HOW MANY LOADS OF GRAIN WERE HAULED"
30 INPUT L
40 FOR I=1 TO L
45 PRINT "HOW MANY BUSHELS ON LOAD NUMBER"; I
50 INPUT B
60 T=T+B
70 NEXT I
80 Y=T/A
85 CLS
90 PRINT "FIELD: "; F$
100 PRINT "TOTAL BUSHELS HARVESTED: "
110 PRINT T
120 PRINT "AVERAGE YIELD= "
130 PRINT Y
135 PRINT: PRINT
140 PRINT "DO YOU WANT TO COMPUTE MORE YIELDS"
150 INPUT Q$
155 CLS
160 IF Q$ = "YES" THEN GOTO 5
170 END
```

MORE GENERAL COMPUTING

AND

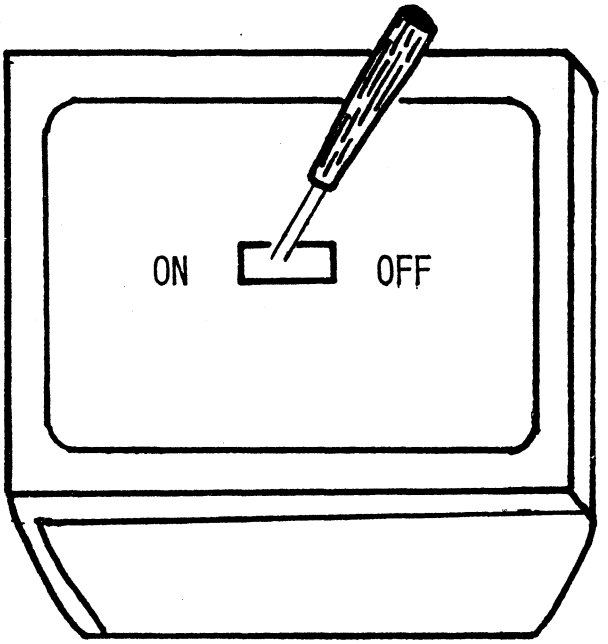
FARM SOFTWARE

- HOW DATA IS REPRESENTED INSIDE THE COMPUTER
- HOW MEMORY AND STORAGE ARE MEASURED
- MEMORY VS. STORAGE -- WHAT'S THE DIFFERENCE?
- FARM SOFTWARE: VISICALC
- TYPES OF SOFTWARE
- FARM SOFTWARE: DATA BASE MANAGER
  WORD PROCESSOR
  SWINE MANAGEMENT SOFTWARE
- WHERE TO GET SOFTWARE

SO WHAT? THEY STILL JUST LOOK LIKE 1's AND Ø's TO ME?

ELECTRICAL SWITCHES CAN EITHER BE

"OFF" OR "ON"

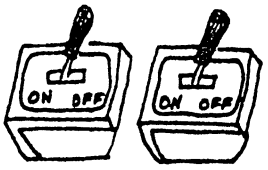


COMPUTER MEMORY CONSISTS OF THOUSANDS OF "ON/OFF"

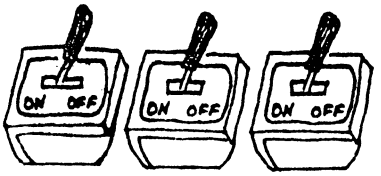
SWITCHES. EACH SWITCH IS CALLED A "BIT"

1 BIT

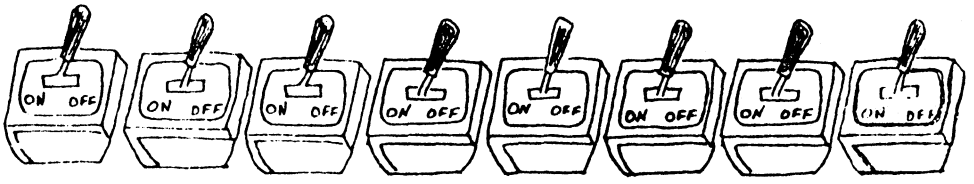
2 BITS

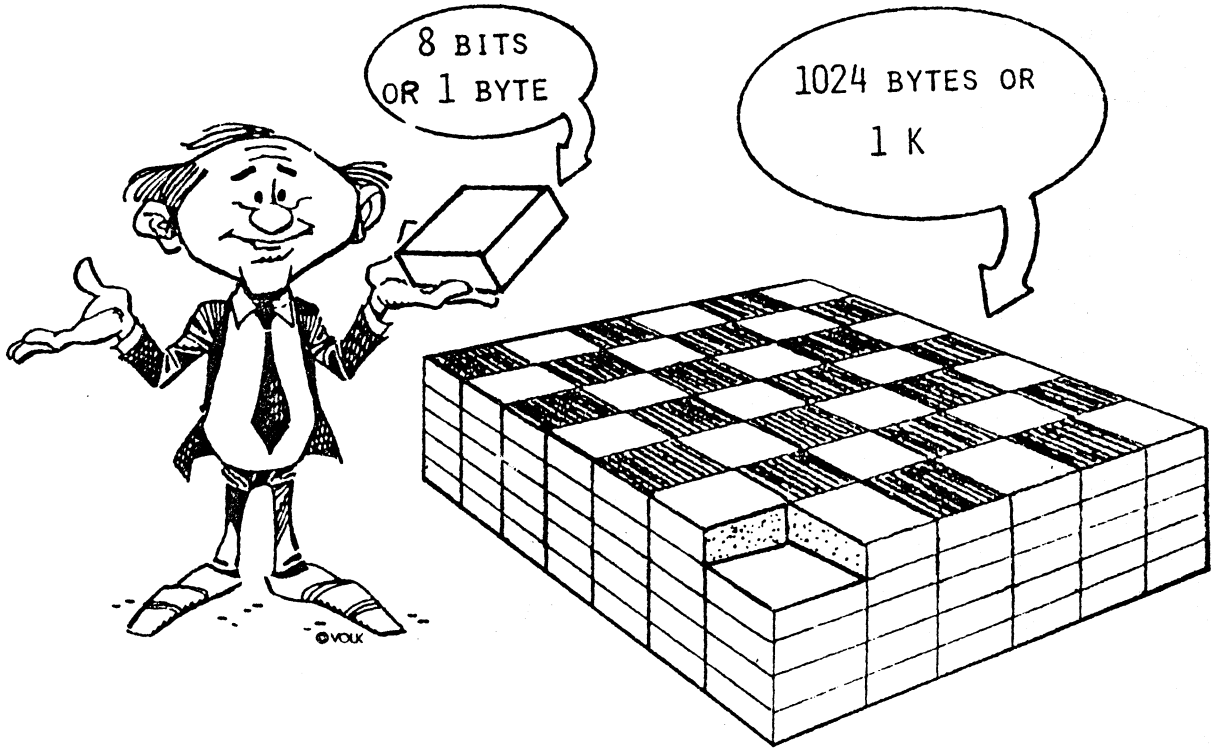


3 BITS

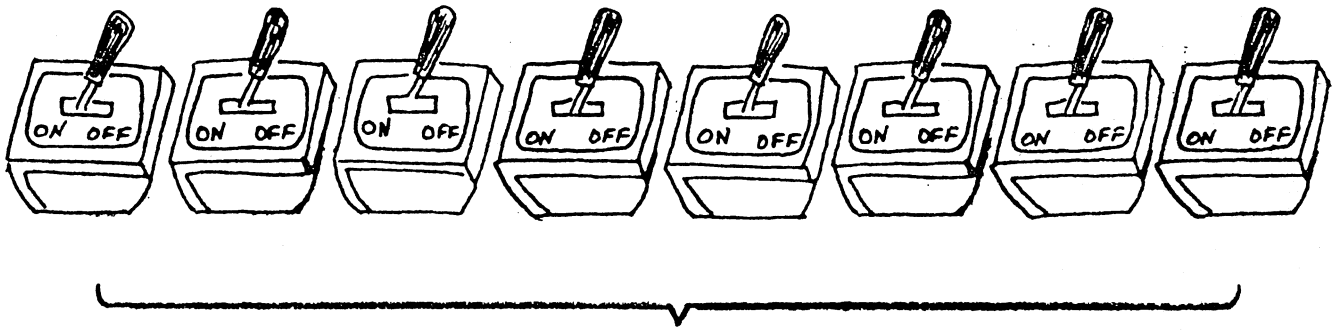


8 BITS




8 BITS
OR 1 BYTE
1024 BYTES OR
1 K
©VOLK

A GROUP OF 8 BITS IS CALLED A BYTE



1 BYTE

KILOBYTE OR "K" :

1024 BYTES OR,

"ABOUT 1000" BYTES

THE WORD "KILO" MEANS 1000.

EXAMPLES:

KILOMETER - 1000 METERS

KILOWATT - 1000 WATTS

WHAT IS SO IMPORTANT ABOUT 8 BITS?

WHAT ARE BYTES USED FOR?

BECAUSE:

USING 8 BITS GIVES US 256 DIFFERENT COMBINATIONS OF "ON" AND "OFF" BITS.

EXAMPLE:

0000 0000
0101 1010
1111 1100
1011 0001
1111 1111

WHY 256 BIT COMBINATIONS?

"255" IS THE LARGEST NUMBER WE CAN REPRESENT USING A SET OF 8 BITS:

BINARY	DECIMAL
0000 0001	1
0000 0010	2
0000 0011	3
0000 0100	4
•	•
•	•
•	•
1111 1111	255

PLUS, WE CAN USE "Ø" AS ONE COMBINATION:

0000 0000	0

SINCE WE HAVE 256 DIFFERENT COMBINATIONS OF 1'S AND Ø'S WE CAN LET EACH UNIQUE COMBINATION REPRESENT:

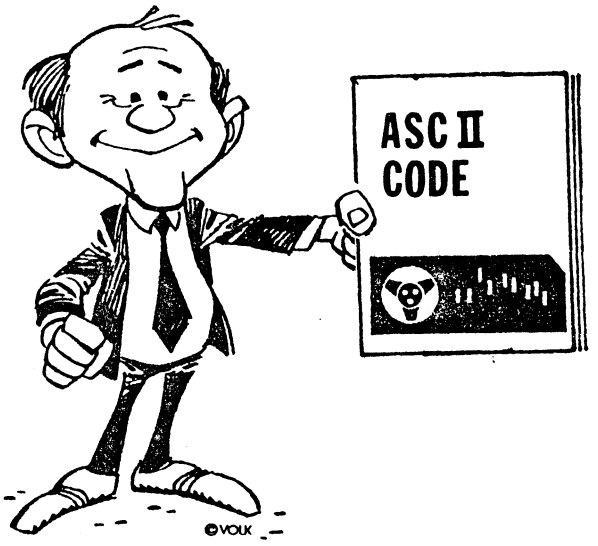
* A DIGIT — "3" = 0011 0011; "7" = 0011 0111
* A LETTER — "A" = 0100 0001; "Z" = 0101 1010
* A SYMBOL: — "+" = 0010 1011; "/" = 0010 1111

OR

COMPUTER DESIGNERS HAVE AGREED ON WHICH DIGIT,

LETTER OR SYMBOL EACH COMBINATION OF

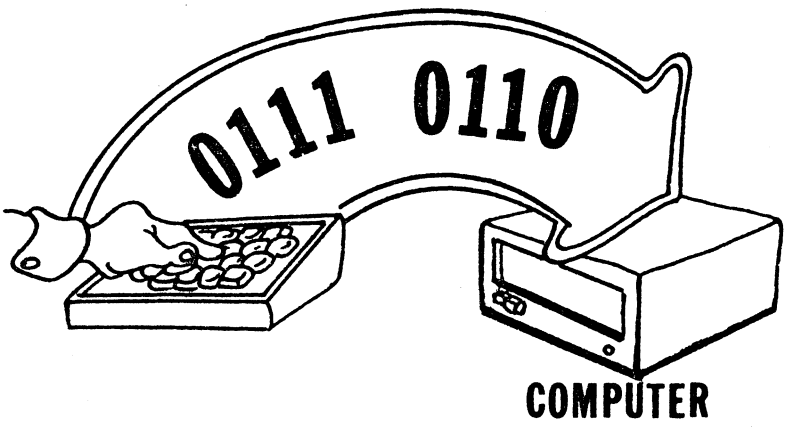
1's AND Ø's WILL REPRESENT



THEY CALL IT THE ASC II CODE

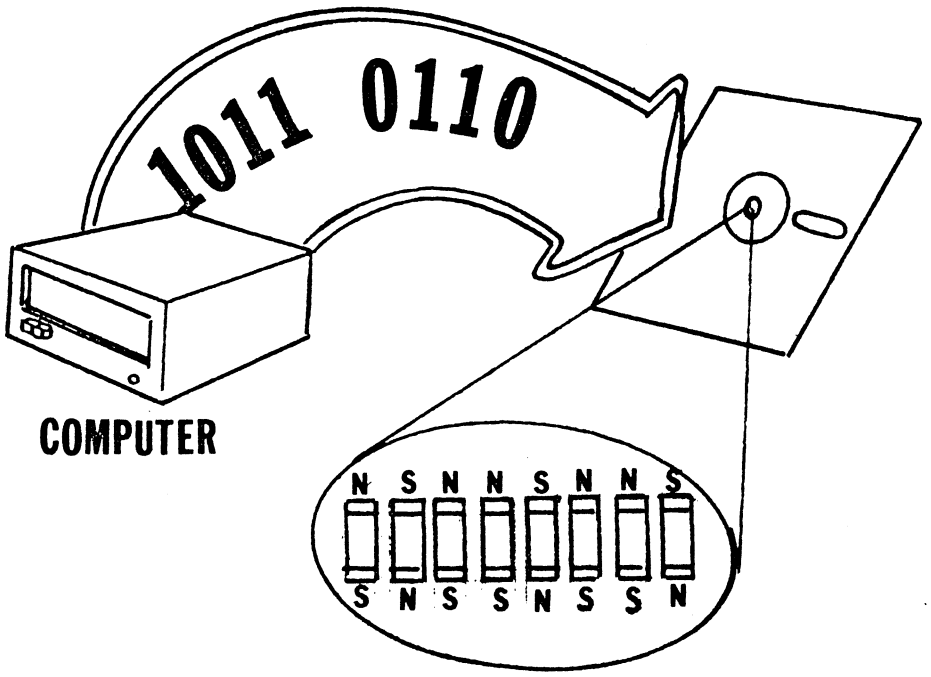
WHEN YOU PRESS A KEY ON THE KEYBOARD, A GROUP OF

8 "BITS" (ONE "BYTE") IS SENT TO THE COMPUTER'S MEMORY



ANY "BYTE" FROM COMPUTER MEMORY CAN BE STORED ON A FLOPPY DISK OR MAGNETIC TAPE, LIKE A GROUP OF

8 NORTH & SOUTH POLE MAGNETS:



MEMORY

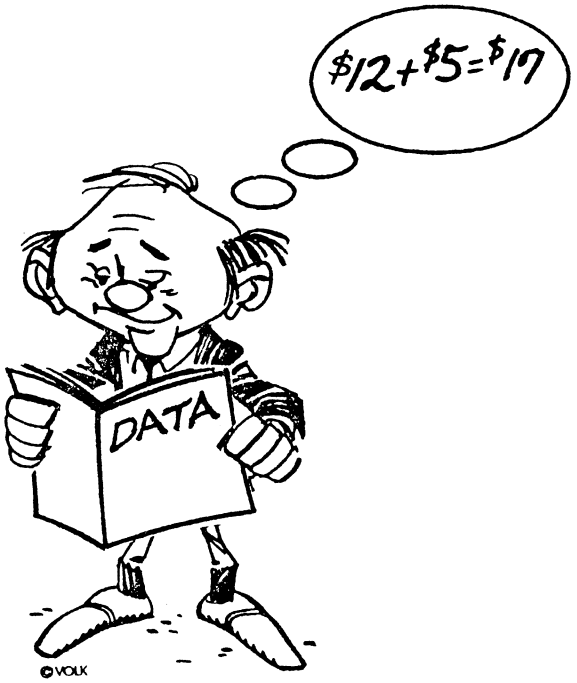
vs.

STORAGE

MEMORY -- HOLDS YOUR COMPUTER PROGRAM AND DATA DURING PROGRAM OPERATION

STORAGE - SAVES YOUR PROGRAMS AND/OR DATA FOR LATER USE

A COMPUTER PROGRAM CANNOT PROCESS DATA IN STORAGE -- DATA MUST BE READ INTO MEMORY FIRST!



Each line on this sheet of paper is 65 characters long (if all letters, blank spaces, punctuation, and symbols are counted). So, each line would require 65 bytes of storage space on a floppy disk, cassette tape, or other storage media.

Fifty-four lines could be typed on this page within the space of this rectangle. Total space required to store this page could be calculated as:

54 lines x 65 characters per line = 3510 characters per page

3510 characters x 1 byte per character = 3510 bytes to store one page

3510 bytes - 1024 bytes per kilobyte(K) = 3.4 K required to store one page

Remember:

1 bit = 1 "on/off" position (like an electrical switch) in the computer

1 byte = 8 bits

1 kilobyte = 1024 bytes
or 1 "K"

◆◆ UMC EXTN. AG. ECONOMICS ◆◆ ◆◆ CROP BUDGETS - 1981 ◆◆			OWNED CORN	OWNED MILO	OWNED WHEAT	OWNED SOYBEANS
◆◆◆ VARIABLE COSTS ◆◆◆						
SEED PRICE PER UNIT:			55.00	29.00	6.00	12.00
UNIT			80000 KRN	50 LBS	BUSHEL	BUSHEL
SEED COST/ACRE			13.75	3.31	10.50	11.00
FERTILIZER:						
ANHYD. AMMONIA	0.16	/LB N	20.80	16.00		
NITRATE	0.23	/LB N			13.80	
PHOSPHATE	0.26	/LB P2O5	13.00	13.00	10.40	5.20
POTASH	0.12	/LB K2O	7.20	7.20	4.80	4.80
LIME	8.00	$/TON	5.00	5.00	5.00	5.00
HERBICIDES:						
ATRAZINE 4L	10.42	$/GAL	3.47	3.47		
ATRAZINE NINE-O	2.45	$/LB				
ATRAZINE 80W						
BLADEX 4L	16.05	$/GAL				
BLADEX 80W		$/LB				
SUTAN+	19.00	$/GAL	19.00			
BEXTON 4L	15.10	$/GAL		11.33		
SURFLAN 4L	44.42	$/GAL				
LASSO 4EC	18.75	$/GAL				9.38
LOROX 50W	5.09	$/LB				7.64
PARQUAT	44.00	$/GAL				
CUSTOM HIRE:						
SPRAYING	3.75	/ACRE	3.75	3.75		3.75
COMBINING	20.00	/ACRE				
FUEL:	GAL/ACRE:		6.3875	6.7375	2.9875	5.8375
FUEL COST	1.15	$/GAL	7.35	7.75	3.44	6.71
LUBE COST	15	% FUEL	1.10	1.16	0.52	1.01
REPAIRS:		$/ACRE	16.00	14.00	13.00	15.00
TRUCKING:	0.02	$/BU.	2.00	1.86	1.00	0.70
DRYING:	0.00	$/BU.	0.00	0.00	0.00	0.00
STORAGE:	0.00	$/BU.	0.00	0.00	0.00	0.00
MISCELLANEOUS:		$/ACRE	12.50	9.50	6.00	7.50
INTEREST:	0.12	%/100	7.38	5.73	4.05	4.62
TOTAL VARIABLE COSTS			132.30	103.05	72.50	82.30

YIELD @ 15% H2O	100	5200	50	35
EXPECTED PRICE	3.50	5.70	4.15	7.75
GROSS INCOME PER ACRE	350.00	296.40	207.50	271.25
MINUS VARIABLE COSTS:	-132.30	-103.05	-72.50	-82.30
INCOME OVER VARIABLE COSTS	217.70	193.35	135.00	188.95
MINUS MACHINERY DEPR. & INTEREST:	-35.00	-28.00	-21.00	-28.00
SUBTOTAL	182.70	165.35	114.00	160.95
MINUS LABOR COST @ 4.00 /HOUR	-22.00	-18.00	-12.80	-18.40
BREAK-EVEN CASH RENT	160.70	147.35	101.20	142.55
MINUS REAL ESTATE TAXES, DEPRECIATION & INTEREST	-84.00	-70.00	-70.00	-84.00
NET PROFIT PER ACRE	76.70	77.35	31.20	58.55
TOTAL OF ALL COSTS PER ACRE	273.30	219.05	176.30	212.70
◆◆◆ BREAK-EVEN PRICE ◆◆◆	2.73	4.21 (CWT.)	3.53	6.08

*Presented at the Cape Girardeau Soils & Crops Conference, February 11, 1981. (Department of Ag Economics, University of Missouri-Columbia), Mark Wilsdorf and Norlin A. Hein.

SOFTWARE CATEGORIES

DATA BASE MANAGEMENT

- DBM, DBMS, IMS, ETC.

ELECTRONIC SPREADSHEET/CALCULATOR

ANALYSIS

WORD PROCESSING

TELLECOMMUNICATION

TUTORIAL

PROCESS CONTROL AND MONITORING

GAMES, LEISURE

SOFTWARE CATEGORIES

DATA BASE MANAGEMENT

- Sort, Search Through, Change, or Summarize a Collection of Related Data
- General Purpose or Special Purpose:
    * Accounting
    * Production Records
    * Address lists, job lists, etc.

ANALYSIS

- Simulation, Planning, Problem Solving:
    * Least-Cost rations
    * Fertilizer recommendation
    * Loan repayment schedule

WORD PROCESSING

- Writing letters, reports, etc.

TELECOMMUNICATION

- Computer functions as a "dumb" or "intelligent" terminal.

TUTORIAL

- Training and Education:
    * Math, Science, English, Etc.
    * Machinery operators' manuals

PROCESS CONTROL AND MONITORING

- Collect and analyze data on some mechanical process, and control (affect) the process based on results of the data analysis:
    * irrigation scheduling
    * feeding dairy cows
    * burglar alarm
    * flow control in a pesticide sprayer
- Mostly in "dedicated" microcomputer systems (small computer systems used only for one task).

GAMES, LEISURE

WHERE TO GET FARM SOFTWARE

1. WRITE IT YOURSELF
   * SMALL PROBLEMS
   * TIME-CONSUMING & DIFFICULT FOR LARGE PROBLEMS.

2. PUBLIC INSTITUTIONS (UNIVERSITIES, ETC.)
   * MOSTLY ANALYSIS PROBLEMS
   * QUESTIONABLE QUALITY--NO RESPONSIBILITY TO USER

3. MAIL ORDER / "OFF-THE-SHELF"
   * HARD TO JUDGE SUITABILITY BEFORE YOU PURCHASE
   * NOT MUCH FARM SOFTWARE YET

4. CUSTOM WRITTEN OR DEALER-BACKED
   * MOST OF THE CURRENT FARM SOFTWARE
   * EASIER TO ASSURE QUALITY/SERVICE
   * OFTEN MORE EXPENSIVE THAN THE OTHER SOURCES LISTED ABOVE.

FARM SOFTWARE SOURCES

Aultman, Larry Sylvester, GA Phone: (912) 776-2577	SYSTEM:	Radio Shack Swine Management Financial Analysis
Bridges, Charles Route 1, Box 210 Sarcoxie, MO 64862	SYSTEM:	Radio Shack Farm Accounting, etc.
Bud Ag Systems Omaha, NE Phone: (402) 422-1234	SYSTEM:	? Swine Management
Century Next Computers Columbia, MO 65201 Phone: (314) 442-6502	SYSTEM:	APPLE Farm Accounting
Computerized Farm Info. Services Stillwater, MN Phone: (612) 436-7198	SYSTEM:	APPLE Swine management & Other
Delta Engineering Corp. 1804 N. Wheeling Muncie, IN 47303	SYSTEM:	Radio Shack
Farm Business Services Aledo, IL Phone: (309) 582-5628 or (309) 582-7781	SYSTEM:	Radio Shack Swine management
Farm Information Services P. O. Box 336 Waterproof, LA 71375 Phone: (318) 749-5535	SYSTEM:	?
Farm Management Services R.R.1, Box 107 Manhattan, IL 60442 Phone: (815) 478-4258	SYSTEM:	?
Financial Systems, Inc. Box 2012 Kearney, NE 68847	SYSTEM:	APPLE

Continued

GOREAU, Inc.
Box 1311
Ballwin, MO 63011

Phone:

SYSTEM: Radio Shack

Harris, Ken
Golden City, MO 64748

(417) 537-8513

SYSTEM: Radio Shack
Swine Management
Farm Accounting

LET-3, Inc.
Blooming Prairie, MN 55917

Phone: (507) 583-2494

SYSTEM: APPLE

Maumee Valley Computer Systems
99 Conant Street
Maumee, OH 43537

Phone:

SYSTEM: ?
Farm Accounting

McNary, Paul
RFD 2
Hamilton, MO 64644

Phone: (816) 583-4828

SYSTEM: Radio Shack
Farm Accounting

Micro Data Systems
Bonners Ferry, ID

Phone: (208) 267-5680

SYSTEM: ?

Mississippi State University
Wallace Kilcrease
Mississippi State, MI 39762

Phone: (601) 325-4436

SYSTEM: Radio Shack
Farm Accounting

Oklahoma State University
Dr. Ted Nelson
Stillwater, OK 74074

Phone: (405) 624-6081

SYSTEM: Radio Shack
Farm Accounting
Livestock Analysis, etc.

Poos, Dale
Route 2, Box 93
Platte City, MO 64079

Phone: (816) 546-3296

SYSTEM: Radio Shack
Farm Accounting

The Computer Center
302 Commercial
Waterloo, IA 50701

Phone:

SYSTEM: APPLE, Pet

University of Minnesota
Dr. Earl Fuller
249 Classroom Office Bldg
St. Paul, MN 55108

SYSTEM: APPLE

AN ON-FARM COMPUTER

GOING OFF ON YOUR OWN

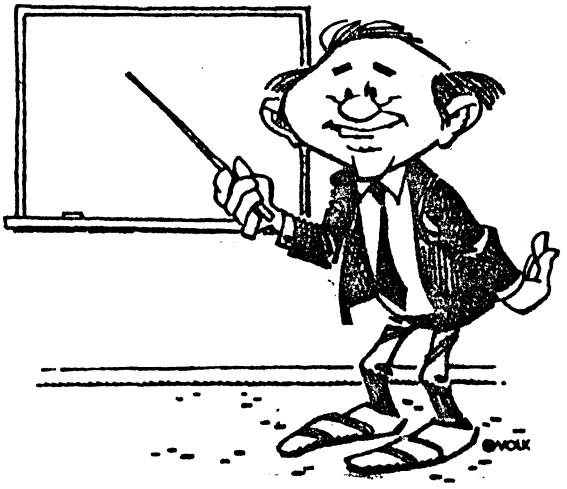
REASONS FOR USING COMPUTERS

* SPEED

* ACCURACY

* LESS DRUDGERY

* COMMUNICATION & ELECTRONIC MONITORING CAPABILITY



DATA MANAGEMENT & RECORD KEEPING

computers help you --

* KEEP MORE DETAILED RECORDS.

* MORE EASILY LOCATE SINGLE RECORDS WITHIN A LARGE NUMBER OF RECORDS.

* ANALYZE AND SUMMARIZE LARGE NUMERS OF RECORDS

DECISION MAKING & PROBLEM ANALYSIS

computers help you * *

* ANALYZE MANY ALTERNATIVES IN A SHORT TIME:

  - WHAT IF FEED PRICES CHANGE?
  - WHAT IF INTEREST RATES GO HIGHER?
  - ETC.

* DO REPETITIOUS CALCULATIONS WITHOUT ERRORS

COMMUNICATIONS & MONITORING

computers help you:

- GATHER INFORMATION MORE EFFICIENTLY THAN A HUMAN COULD:
  - COMMODITY PRICES
  - WEATHER REPORTS
  - GRAIN MOISTURE IN A BIN
  - FEED CONSUMPTION BY A DAIRY COW
- MONITOR AND CONTROL MECHANICAL PROCESSES THAT REQUIRE INSTANT REACTION:
  - GALLONS PER ACRE METER ON A CROP SPRAYER
  - SPEEDOMETER FOR ACTUAL TRACTOR GROUND SPEED

CONSIDERATIONS IN USING A COMPUTER

- FOR RECORD KEEPING, BETTER DATA IS REQUIRED:
  - MORE ACCURATE
  - MORE COMPLETE (NO MISSING DATA)
  - MORE DATA ALTOGETHER (SOMETIMES MORE NUMBERS ARE REQUIRED TO GET THE SAME ANSWERS)
- TIME IS NEEDED TO LEARN HOW TO USE THE COMPUTER
- YOUR METHODS OF RECORD KEEPING AND ANALYSIS MAY HAVE TO CHANGE SLIGHTLY
- A COMPUTER MAY NOT BE COST JUSTIFIED IN YOUR OPERATION

COMPUTERS ARE VALUABLE --

** FOR RECORD KEEPING O N L Y IF YOU ARE ALREADY A "RECORD KEEPER"

** WHERE LARGE AMOUNTS OF DATA MUST BE HANDLED

** WHERE TIMELINESS OF DATA IS IMPORTANT

HARDWARE CONSIDERATIONS

- COMPONENTS - DEPENDS ON THE JOB YOU ARE DOING AND SOFTWARE USED FOR THAT JOB
- CAPACITY - DEPENDS ON THE JOB YOU ARE DOING
- COST - DEPENDS ON CAPACITY AND QUALITY

THE DISK CAPACITY YOU NEED DEPENDS ON THE

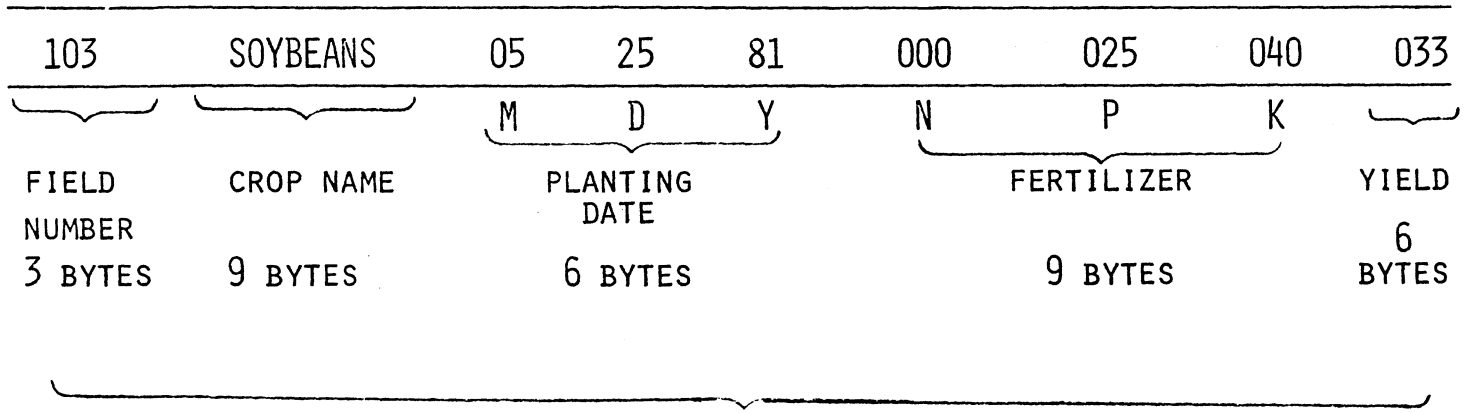
S I Z E

AND

N U M B E R

OF RECORDS YOU KEEP.

FIELD RECORD EXAMPLE:



30 BYTES x 40 FIELDS = 1200 BYTES OF DISK SPACE PER CROP YEAR

WHY D I S K S INSTEAD OF C A S S E T T E T A P E ?

** RANDOM DATA ACCESS

** FASTER

** MORE RELIABLE

** REQUIRED BY MOST AVAILABLE FARM-BUSINESS SOFTWARE

WHY T W O DISK DRIVES?

** MORE STORAGE SPACE AVAILABLE AT ONE TIME

** "BACKUPS" AND COPIES ARE EASIER TO MAKE

** MUCH SOFTWARE REQUIRES TWO DISK DRIVES TO OPERATE

WHY A PRINTER?

** PERMANENT COPIES OF REPORTS, RECORDS, ETC.

** "ACCOUNTING TRAIL"

** REPORTS ACCEPTABLE TO OUTSIDERS
(LENDERS, ETC.)

** COPYING RESULTS BY HAND (FROM CRT SCREEN)
WOULD RE-INTRODUCE DRUDGERY

PRINTER SPEED

** 10 - 180 CHARACTERS PER SECOND (C.P.S.)

** DEPENDS ON VOLUME OF PRINTING TO BE DONE

How much MEMORY do I need?

- WHATEVER AMOUNT IS REQUIRED TO OPERATE THE PROGRAMS YOU WANT TO RUN

TODAY = 48K to 64K as a minimum

TOMORROW = ?

RAM vs. ROM

RAM - RANDOM ACCESS MEMORY

NOT PERMANENT, ERASABLE, CAN BE READ OR WRITTEN INTO BY THE COMPUTER

ROM - READ ONLY MEMORY

PERMANENT, NOT ERASABLE, CAN ONLY BE READ BY THE COMPUTER

RAM IS AVAILABLE TO HOLD YOUR PROGRAM AND DATA

ROM IS ONLY AVAILABLE TO THE COMPUTER, FOR INTERNAL USE

TYPICAL FARM BUSINESS COMPUTER SYSTEM

** CRT DISPLAY

** KEYBOARD

** PRINTER

** TWO DISK DRIVES

** 48K OF RAM MEMORY, OR MORE

** COST: $3,000 TO $8,000

COMPUTER OPERATING COSTS

	$/YEAR
STORAGE MEDIA (FLOPPY DISKS)	30 - 60
PRINTER PAPER	30 - 80
ELECTRICITY	5 - 10
MAINTENANCE	25 - 200
MISCELLANEOUS	10 - 50
TOTAL	$100 - $400 PER YEAR

SERVICING ARRANGEMENTS

** SERVICE ARRANGEMENTS

** DEALER SERVICING

** "SEND-AWAY" SERVICE

V I D E O T E X T

- ADVANCED IN EUROPE AND CANADA
  - * GRAIN & LIVESTOCK PRICES
  - * WEATHER INFORMATION
  - * WORLD NEWS
- COMING IN THE U.S.
  - * COMMUNICATIONS METHOD: TV VS. TELEPHONE
  - * BARRIER: U. S. COMMUNICATION SYSTEM, LAWSUITS
  - * PROJECT GREEN THUMB
  - * PRO FARMER
- FUTURE?
  - * DECREASED COMMUNICATION COSTS
  - * BUYING/SELLING OF COMMODITIES
  - * REMOTE COMPUTER PROCESSING (AUTOMATED ACCOUNTING, ETC.)

INFORMATION AVAILABLE
FROM ONE PRIVATE VIDEOTEXT SERVICE

(PROFESSIONAL FARMERS OF AMERICA)

Instant Update

Access Codes and Description

Code	Item	Max. no. Screens	Description
1	Pro Farmer Today & Prices	16	Pro Farmer Today plus futures quotes for corn, beans, cattle and hogs
6	Yesterday's Futures Prices	4	Closing price pages from yesterday
9	Pro Farmer Today	12	The complete daily newsletter, with 7 screens of news and 5 screens current analysis and recommendations
11	Yesterday's Pro Farmer Today	7	The 7 screens of news that were on the previous day. Changes at 5 pm.
13	Morning Report	5	Special news pages put on each morning at 10:00 to update market information
15	World Weather Watch	3	Weather information affecting crops worldwide, and what it means to supply, demand and prices
25	Your State's Weather	1	The current weather forcast for your state
50	Special Alert	4	The really hot news and advice changes
101	Soybean Cash Market Scan	1	--
102	Corn Cash Market Scan	1	: Listing of cash quotes and basis at different locations around the country
103	Wheat Cash Market Scan	1	:
104	Cotten Cash Market Scan	1	--
105	Cattle Cash Market Scan	1	--
106	Hogs Cash Market Scan	1	: Listings of cash prices at different locations nationwide (Updated at 9:30,11:30 & 4:30)
108	Feeder Cattle Cash Market Scan	1	:
109	Dressed Meat Market Scan	1	--
110	Gulf Cash Market Scan	1	Table of Gulf bids for grains & basis
111	Portland Cash Market Scan	1	Table of bids at Portland for export grains and basis
112	Minneapolis Cash Market	1	Table of bids at Minneapolis for grains
113	Kansas City Cash Market Scan	1	Table of Kansas City grain bids
150	Washington Watch	16	Additional information from Washington, details not covered in news section, breakdown on major USDA reports and other reports
200	Marketing Plan Review	1	A listing of each Marketing Strategy and Tactics Page, and the last date each was updated

201	PFA Soybeans Mktg Strategy	2	--
202	PFA Corn Mktg. Strategy	2	Details of Pro Farmer's long term marketing plan and thinking and an overall plan
203	PFA Wheat Mktg. Strategy	2	
204	PFA Cotton Mktg. Strategy	2	
205	PFA Cattle Mktg Strategy	2	
206	PFA Hog Mktg Strategy	2	--
207	PFA Feed Buying Strategy	2	Details of Pro Farmer's longterm thinking for corn and soybean meal ;their overall buying strategy
301	PFA Soybean Market Tactics	2	--
302	PFA Corn Market Tactics	2	Pro Farmer's intermediate-term plan for marketing these commodities - how we're looking at the market and details on our thinking
303	PFA Wheat Marker Tactics	2	
304	PFA Cotton Market Tactics	2	
305	PFA Cattle Market Tactics	2	
306	PFA Hogs Market Tactics	2	--
307	PFA Feed Market Tactics	2	Pro Farmer's intermediate-term soybean meal - how we view the market, details on our thinking
400	Technical Triggers	3	A page summarizing support, resistance and trend for the major futures markets. Other pages cover technical developments that may be near - breaking of trendlines, retracements, gaps, etc
501	Ag Price Chart Trends	10	--
502	Financial Price Chart Trends	7	The Trendlines Analysis from the current issue of Commodity Price Charts. Updated every Friday afternoon while CPC is on press
503	Metals Price Chart Trends	6	
504	Foods/Woods Price Chart Trends	6	--

There are 55 additional codes for obtaining weather for each of the states and some regions of the U.S.

Access Codes For Futures prices

Item	Current Quotes	Yesterdays Closes
Soybeans	51	451
Corn	52	452
Chicago Wheat	53	453
Kansas City Wheat	54	454
Minneapolis Wheat	55	455
Hogs	56	456
Pork Bellies	57	457
Live Cattle	58	458
Feeder Cattle	59	459
Soybean Meal	60	460
Soybean Oil	61	461
Oats	62	462
Sunflowers	63	463
Sugar	64	464
Chicago Gold	65	465
Chicago Silver	66	466
T-Bills	67	467
T-Bonds	68	468
GNMA'S	69	469
New York Cotton	70	470
New Orleans Rice *	71	471
New Orleans Cotton *	72	472

* closes only until mid-1982

Each page of futures prices takes aproximately 10 seconds to transmit.

GLOSSARY

ASC II. American Standard Code for information interchange. A standardized code for storing data and transmitting it among computers.

Binary Arithmetic. Calculations using only "1" and "0" as digits.

Code Word. Any of the special words or symbols which make up a computer programming language. They are called "code words" because each is a "code" for some instruction to the computer. For example: The BASIC language code work for output is "PRINT".

CRT. Cathode Ray Tube. The television-like screen used to display computer input and output.

DATA. Facts, figures, numbers, etc. that you wish to manipulate to help you solve a problem or draw some conclusion.

Data Base Management System. Same as data management systems.

Data Management System. A computer program or set of computer programs which allow you to store and retrieve many different kinds of data. Most data management systems let you sort the data in any order, summarize it, find individual records within a large group of records, and print the data or summaries of it on paper.

Debug. A slang computer programming term meaning to remove errors (or "bugs") from a computer program.

Disk Drive. Device which reads data from, and writes data onto, a floppy disk.

Dot-Matrix Printer. A mechanical device for printing computer output on paper. A group of small wires is used to strike an inked ribbon, to print characters on paper. Choosing different combinations of wires produces different characters.

Electrosensitive printer. A mechanical device for printing computer output on paper. Electrosensitive printers use a special aluminum-coated paper. Electricity is applied to small areas of the paper, darkening it in the shape of letters, numbers, or other characters.

File. A collection of related data stored on a floppy disk, cassette tape, or other storage medium. For instance, records on all of this year's crops might be stored in one file, while last year's crop records might be stored in another file.

Floppy Disk. A flexible plastic disk coated with a magnetic substance, and used for storing data in the form of magnetic pulses. Floppy disks are enclosed in a square plastic jacket to keep them clean. Most floppy disks are either 5¼ or 8" in diameter. (The 5¼ inch size is commonly called "mini-floppy").

Flowchart. An outline or sketch representing the sequence of instructions in a computer program. Special "flowchart symbols" are usually used to indicate the type of instruction to be performed at each point in the flowchart.

Hardware. Physical parts of a computer--what you can see and touch. Includes keyboard, disk drives, CRT, etc.

Information. Facts, figures, numbers, etc. which actually add to your knowledge or understanding of some problem or situation.

Information Management System. Same as data management system.

Input. The process of putting data into a computer's memory. Example: typing at a keyboard.

I/O. An abbreviation for "input and output".

I/O Devices. Computer hardware used for input and/or output. Examples: Keyboard, printer, CRT display screen, etc.

Memory. Part of the computer where computer programs and data are held. Memory only operates while the computer is "ON". When the computer is turned "OFF", everything held in memory is lost. To keep a permanent copy of a program or data, some kind of storage is needed (see storage).

Microcomputer. A digital computer which uses a microprocessor to perform its calculations, and which generally costs less than $10,000.

Microprocessor. The part of computer hardware responsible for executing instructions (such as the instructions in a computer program), controlling operation of the computer, and performing calculations, etc.

MODEM. MOdulator-DEModulator. A device which allows your computer to communicate by telephone with another computer. A modem converts your computer's electrical pulses into audible sounds which can be sent via telephone lines to the other computer. It also converts sounds sent by the other computer, into electrical pulses which your computer can understand.

Output. The process of getting results out of the computer's memory and putting it in some form that you (the computer-user) can recognize--eg., printed on paper or on a CRT display screen.

(Glossery - continued)

Processing. Manipulation of your data according to instructions contained in a computer program, to arrive at some result or answer.

Program. A set of instructions arranged in a logical sequence. which directs a computer to perform some task or solve a problem

Programming Language. An organized system of words, symbols, etc. which allows you to give instructions to a computer (in the form of a computer program).

Software. Instructions necessary to allow you to operate a computer. Includes computer programs, instruction manuals, etc.

Storage Media. The physical material on which data is stored. Cassette tape and floppy disks are examples of storage media.

Terminal. Device capable of connecting to a computer and communicating with it to input data, output results, or both. Example: together, a keyboard and CRT screen may be considered as a terminal.

Thermal Printer. A mechanical device used to print computer output on paper. Thermal printers use special chemically-treated paper which darkens wherever heat is applied. Thermal printers print on this paper by heating groups of small dots to form letters, numbers, or other characters.

Variables. The "names" assigned to memory locations by a computer program. These "names" are called variables because the data held at each memory location may be "varied" (changed) by the computer program.

A BASIC COMPUTER LANGUAGE SUMMARY

Input Statements

INPUT — Prints a question mark (?) on the CRT display screen and waits for you to type in data for a certain variable.

Examples:
```
10  INPUT A
20  INPUT B$
```

Processing and Program Control Statements and Symbols

\+ Addition

Example: `10 A = B+C`

\- Subtraction

Example: `20 C = A-B`

* Multiplication

Example: `30 D = Q*C`

/ Division

Example: `40 X = D/N`

(NOTE: Any number of arithmetic symbols can be used in a processing statement:

Example: `50 A = 7*B + 3/C - 17`

GOTO — Sends program control to another line:

Example:
```
10  INPUT A
20  B = A * 1/4
30  Print B
40  GOTO 10
```

This short program asks the user to enter data for the variable "A" (line 10). "A" is multiplied by one-fourth and the result is stored in the variable "B" (line 20). Then, the value stored in "B" is printed out (line 30). Line 40 sends program control back to line 10, to run through the program again. (This program will continue to run forever, or until you stop it by using the BREAK key).

IF . . . THEN . . . If the condition between the code words "IF" and "THEN" is true, then the statement following the "THEN" will be executed.

Example: `45 IF A = B THEN GOTO 10`

If the value stored in "A" is equal to the value stored in "B", then program control will be transferred to line 10.

(NOTE: If the condition between the code words "IF" and "THEN" is not true, the statement following "THEN" will not be executed. Program control will simply pass to the next line of the program).

Besides the equal sign, "=", there are other symbols which can be used to compare a relationship in an "IF . . . THEN" statement. Some of them are:

<	Less than
>	Greater than
=	Equal to
< =	Less than or equal to
> =	Greater than or equal to
< >	Not equal to

An example of their use would be:

```
110 IF C > =D THEN PRINT C
```

If the value stored in "C" is greater than or equal to the value stored in "D", then print out the value stored in "C".

FOR . . . STEP . . .

Indicates the beginning of a "program loop." All statements occurring between this statement and the nearest following "NEXT" statement will be executed for the number of times indicated.

Example:
```
10 FOR I = 1 to 10   STEP 2
20 PRINT I
30 NEXT I
```

First, the variable "I" is assigned the value "1" (line 10). Then the value stored in I (which is "1") is printed out (line 20). When the "NEXT" statement is reached (in line 30), program control passes back to line 10. Now back at line 10, the step value "2" is added to the value stored in "I", and the result is put back into variable "I". Then this value stored in "I" (which is now "3") is compared with the maximum range of the loop ("10"). If "I" is still less than "10", the loop will be run through again (program control will go to line 20). If I is greater than "10", then program control will go to the line immediately following line 30.

(NOTE: The "STEP. . ." part of this statement may be omitted if the step is "1").

Example:

```
10 FOR J = 1 to 10
20 X = 2 * J
30 PRINT J,X
40 NEXT J
```

This "loop" prints out the numbers one through ten, along with their double (the numbers two through twenty), as follows:

```
 1    2
 2    4
 3    6
 4    8
 5   10
 6   12
 7   14
 8   16
 9   18
10   20
```

Then program control passes to the line immediately following line 40.

NEXT

Marks the end of a program loop. Control passes back to the most recent "FOR . . . STEP . . ." statement

END

Marks the end of a BASIC computer program.

Output Statements

PRINT Prints out the value of variables, or messages enclosed in quotation marks:

Examples:

```
105 PRINT A,B
220 PRINT "End of program"
230 END
```

VARIABLES

Variables are the names you assign to the computer memory locations which store your data.

Numeric Variables — The names you give to memory locations containing numbers. Numeric variable names may be either a letter of the alphabet, or a letter followed by a single digit.

EXAMPLES: A, A1, A7, X, P, P9

Alphanumeric (or "String" Variables): — The names you give to memory locations containing words, letters of the alphabet, or symbols. Alphanumeric variable names are the same as numeric variable-names (see above) EXCEPT that they are immediately followed by a dollar sign ($).

EXAMPLES: A$, A1$, A7$, X$, P$, P9$

COMMANDS

(Commands do not require line numbers, while program statements do not require line numbers, while program statements do require line numbers).

RUN	Run the program currently in memory.
LIST	List the program currently in memory onto the CRT display screen.
NEW	Erase the program currently in memory.

A COMPUTER FOR YOUR FARM:

Some Things to Think About

Are you interested in using a computer on your farm? Farm magazines and the news media have been full of stories about farmers using computers. So you have probably heard that computers can be a big help in managing a farm business. But you have also heard that it is easy for a first-time computer buyer to make mistakes--to buy a computer that does not fill his needs or suit his "style" of management. How do you decide whether or not you would benefit from using a computer? And if you think you might benefit from using one, how do you choose the computer system that is right for you?

This publication may not answer all your questions, but it should give you a head-start on the information you need. The first part contains basic information about what computers are, why they are useful, how they work, and what the parts of a computer are called. Next comes a discussion about learning how to use a computer, and deciding whether you would benefit enough from having a computer to justify owning one. Finally, a step-by-step approach is presented dealing with how to buy a computer system.

What this publication does not contain is a lot of strange computer terms and technical talk. Hopefully, it will give you enough general information about computers to help you: (1) decide whether computers are worth looking into for your farm operation, (2) talk more comfortably with computer salesmen, and (3) get started in learning more about this new farm management tool.

What is a Computer--Anyway?

Someone has said that a computer is really just a "cross between a calculator and a file cabinet." That's not a bad description. Like a calculator, a computer can perform mathematical operations: add, subtract, multiply, divide, and compare numbers. But unlike most calculators, computers can also store numbers, words, and other information in an organized manner so that it can be recalled at some later time--just as you might store folders of information in a file cabinet.

More will be said later about what a computer "is." For now, all you need to remember is that a computer is an electronic device capable of doing thousands of calculations per second, and capable of storing information for later recall.

A "microcomputer" is a type of computer that generally costs less than $10,000 and uses a microprocessor (small computer chip) to perform calculations. Since most farm computers are microcomputers, they will be the only type discussed. When the word "computer" is used here, realize that it actually refers to microcomputers--computers inexpensive enough to be used on individual farms and in small businesses.

Why Use a Computer?

You may have heard that computers have no more calculating ability than humans. That's correct. Given sufficient time, a human can do any calculation a computer can.

Then why use a computer? There are three main reasons:

(1) Letting computers do the work of calculations frees human time for other pursuits--such as spending more time in the farrowing house, or

out checking the crops.

(2) Because computers are machines, they can do repetitious calculations without getting tired and making mistakes.

(3) Because computers are thousands of times faster than humans, they can provide more timely information.

Most people fail to realize how significant this third reason is. The speed of computers allows calculations, analysis, and summaries of information that would not be feasible for a human to do by hand, simply because they would take too much time.

Consider the job of keeping detailed crop records by hand, on a field-by-field basis. If you have tried this, you may have found that if you write down all the crop data you want to keep--planting dates, herbicides, plant population, fertilizer rates, yield, etc.--and do it for each field, you have a "lot of paper" by the end of the year. Even a limited summary of such detailed records can take hours or days to do by hand. A computer could provide a detailed summary in minutes and would permit you to analyze the data in many different ways--for instance, comparing this year's soybean yield with the average yields of the past five years on your farm, the past ten years, etc.

This is an important point. Because of their speed in summarizing and analyzing data, computers let you keep more detailed records than you would attempt to keep if those records had to be summarized by hand. That is, computers help you glean management information from detailed records--items such as a sow's average production for her past three letters, or the percent of equity you have in your farm--without you having to spend too much time to get that information.

Computers also let you quickly forecast the results of various business plans. Suppose your lender wants estimates of what your next year's cash flow

situation would be at low crop prices, medium prices, and at higher prices. It might take a whole day to prepare three detailed twelve-month cash flow plans if you did them by hand. A computer would help you prepare them in a few minutes.

A Working Computer

In order for a computer to work, two main items are required. One is called "hardware," and the other, "software." The term "hardware" refers to the physical parts of a computer. Anything you can see or touch--electronic circuits, wiring, the computer cabinet, etc.--is part of a computer's hardware. "Software" refers to instructions that tell the computer how to solve a problem, analyze your data, etc. "Software" is just another word for "computer programs." Said differently, both "software" and "computer program" are terms for a list of instructions that tell a computer how to go about doing some job.

A computer cannot do any job unless it has both hardware and software, working together. One way to visualize how hardware and software work together is to think of hardware as being a tractor, and software as being those implements the tractor can pull. The tractor (hardware) provides the power and ability to do work. The implements (software) determine what type of work will be done--plowing, disking, planting, etc. By themselves, neither the tractor nor an implement can do any work; but used together, much can be accomplished. Likewise, a computer (hardware) cannot do work without a computer program (software), but together they can provide solutions to problems.

Not all implements will fit all tractors. They must have compatible hitches and hydraulic couplings, and the tractor's horsepower must be matched with the

implement's working depth and width. So it is with computers. For a computer and a program to work together, the program must be compatible with the computer. Most programs are designed to be used in only one type of computer, and will not work in other types without some modification.

HARDWARE

When automobiles were first introduced everyone was faced with learning some new words--muffler, transmission, radiator, etc. As automobiles became common-place, so did those words. Now, no one thinks of automotive terms as being difficult or strange. Almost everyone understands enough about his or her car to tell a mechanic that the fender is wrecked, the motor is not running properly, or the radiator is leaking.

People using computers have a basic understanding of computers and common computer terms. To talk with a computer salesman or repairman you will need a similar understanding of what the parts of a computer are and what each part does. Just as only a few people became automobile mechanics few will become computer technicians, but every computer user will have enough understanding to communicate with a technician or with other computer users about his computer.

This section describes the hardware that makes up a computer system and tells what hardware is common in farm computer systems. It also explains what each major component does, and introduces you to terms that anyone buying a computer should know.

Input Devices

The word "input" is just a backward way of saying "put in." An input device, then, is something which lets you put data into a computer.

Keyboards are the most common input device, and every farm computer should have one. Computer keyboards are identical to typewriter keyboards, with the exception that some computer keyboards have additional keys--above or to either side of the standard keys.

Other special input devices--like this one, called a digitizer--can also be used. A digitizer lets you describe visual images and shapes to the computer. By tracing around a map, picture, etc., using the digitizer, your computer receives data about the shape and size of whatever you are tracing. Though few farmers currently use them, digitizers and similar devices may someday be important on the farm. One of their potential uses is in keeping field crop records. With a digitizer you could trace around field maps noting soil type changes, problem weed areas, and the like. Your computer would store each map for later recall along with soil test report results, yield data, and other field records.

Other special input devices may someday be popular with farm computers. Already, sensors which can input data about temperature, moisture, heat, and light are available. They allow monitoring the condition of grain in a bin, soil moisture in an irrigated field, or body temperature in an animal. Considerable research is being done using television cameras and microphones for input. You may eventually be able to keep computerized records by simply talking into a microphone. For now though, keyboards are the "standard" input device.

Memory and Storage

When you type something on a computer keyboard, where does it go? What does the computer do with the things you have typed?

*** picture of memory board ***

Everything you type is stored, at least temporarily, in the computer's memory. Memory in computers--as in hand-held calculators--consists of electronic circuits made of plastic, solder, memory chips, and other electronic parts. You do not see memory circuits because they are tucked away inside the computer somewhere--usually in the same case that houses the keyboard or some other component.

Since no one can actually see data stored in memory circuits, it is sufficient just to know that your data is stored there while it is being processed by the computer. Memory circuits also are used to hold a computer program while the computer is reading the program's instructions and processing your data.

Most memory circuits can "remember" data only while the computer is being supplied with electricity. As soon as the computer's switch is turned "OFF" or someone pulls the power plug, the entire contents of the memory is lost.

Computers can be purchased with different amounts of memory. If you listened to a group of farmers talking about their computers, you would probably hear someone mention "32K" or "48K." "K" is an abbreviation for the word "kilobyte," which is the unit of measurement of computer memory. One kilobyte or "K" of memory is roughly the amount needed to store 1,000 characters of information. ("Character" is a general term meaning any letter of the alphabet,

numeral, punctuation mark, or other special symbol.) So, a "48K computer" is one with a memory capacity large enough to hold approximately 48,000 characters. To put this into perspective, realize that one full page of a typed business letter contains a total of about 3,000 characters--spaces, letters, and punctuation marks. Such a lettter could be stored in about 3K of computer memory.

Computers can have two types of memory: RAM (random-access memory) and ROM (read-only memory). For you, as a computer buyer, only the amount of RAM a computer has is of much importance. Your computer programs and data can be held in RAM memory, but not in ROM. The amount of RAM a computer has is usually optional, while the amount of ROM is set. (A certain amount of ROM is required for storing special instructions in some computers.)

Since the amount of memory a computer has is optional, how do you know how much your computer needs? This question is usually answered by finding out how much memory is required to run the computer programs you want to use. Companies selling programs can tell you how much memory your computer will need for operating their programs. Most currently available farm programs require at least 32K or 48K of RAM memory. As farm programs become more sophisticated, more and more memory will be required in the future.

Suppose you have typed data into a computer--say, the amount of fertilizer and herbicide used in a field--and you would like to be able to store that data for recall several months or years from now. As soon as you typed the data it was put in the computer's memory. But, as mentioned earlier, if you turn the computer "OFF" everything in memory would be lost. How can your computer store data in a more permanent form?

Most farm computers use floppy disks for permanent storage. Floppy disks

(sometimes called "floppies," "diskettes," or just "disks") are 5-inch or 8-inch diameter circles of flexible plastic, coated with a magnetic material--just like the material audio cassettes and eight-track tapes are made of. Each floppy disk is enclosed in a square plastic outer jacket to keep it clean.

Just as music can be recorded on tape, data can be recorded on a floppy disk by magnetizing the disk surface. A "disk drive" spins the disk in the same way that a record player spins a phonograph record. Through holes in the disk's outer jacket, the disk drive mechanism can touch the surface of the disk and record ("write") data or retrieve ("read") previously recorded data. Data is recorded in invisible concentric circles on the disk, arranged like growth rings in the cross-section of a tree trunk.

Computer programs can be stored in the same fashion. The computer simply transfers them from memory to the surface of the disk. Because disks are easily transported, handled, and mailed, most business programs--farm programs included--are sold as recordings on floppy disks.

The storage capacity of floppy disks is measured in kilobytes, the same unit used to measure memory capacity. Disk storage capacities range from around 100 to 1,000 kilobytes, depending on disk size, make and model of computer, and on the computer's software.

Farm computer systems generally have two disk drives, although from one to four can be used with most microcomputers. As with memory, the capacity and number of disk drives you need depends on what programs you want to use. Any software company can tell you what disk hardware you will need for operating their programs.

Cassette tapes--identical to the ones used for recording music--can also be

used for data and program storage. Special connecting cables allow common tape recorders to be used with many computers. But some computers require a special tape recorder.

The initial cost of a tape recorder is only 10 to 20 percent of what a disk drive costs. Because tape recorders are inexpensive, they are popular among computers for "home" use--for playing games, preparing family budgets, and running other household and leisure time programs. But when large volumes of important data must be stored, as in a farm business, cassette tape recorders have several drawbacks:

(1) They store and retrieve data at a rate many times slower than disk drives.

(2) They tend to be more error prone than disk drives, in recording and reading data.

(3) They do not allow "random access" of data.

Disk drives do allow "random access," which means they can read individual pieces of data from anywhere on the surface of a floppy disk. Cassette tapes allow only "sequential access": data must be read in the order it was written on the tape. For example, if you wanted to find the record for a sow with ear tag number 103, a cassette recorder would first have to read through all the records for sows numbered 1 through 102. A disk drive could immediately read the 103rd record without having to read through the lower numbered records.

Besides floppy disks and cassette tape, other storage devices may soon be important. "Hard disks" are beginning to be produced at low enough prices to be an attractive storage alternative for microcomputer users. Previously, hard disks were extremely expensive and available only for large computers. They operate on the same principles as floppy disks, but are faster and offer many times the storage capacity.

Again, your choice of a permanent storage device really depends on the computer programs you want to use. Since most farm programs require that disk drives be used, a cassette tape recorder is seldom necessary.

Processing

To be an improvement over manual record keeping and analysis, a computer must process your data somehow. The part of a computer which does all processing is called the central processing unit (CPU), or central processor.

The CPU in a microcomputer is called a microprocessor. The word "micro" means "small," so a microprocessor is just a small computer processor. Such great progress has been made in computer technology that the computing ability which used to require a room full of electronic equipment, in the 1050s, can now be had on a silicon chip the size of a dime. The fact that these chips and related electronic components have become less expensive is why computers have become inexpensive enough to use in farm businesses.

The central processing unit can be thought of as the heart of a computer. Acting upon the instructions in a computer program, the CPU controls all devices that make up the computer system. It determines when to accept data you've typed at the keyboard, when and how to transfer data from memory to a floppy disk, and in general it controls all processing of your data. So that the CPU can do this processing, it has been given the ability to do arithmetic, compare numbers and words, and make simple decisions.

What kind of decisions can a computer make? Actually the computer, itself, cannot make any decisions except by following the instructions in a computer

program. If the instructions provide rules for making a decision, the computer can compare your data to those rules and make a decision based on the comparison.

Let's look at an example--the decision of whether or not to cull sows from a sow herd. Suppose that you have kept good records on your herd, faithfully typing sow production data into your computer after each farrowing and weaning. And suppose you would like to cull from the herd any sows that had weaned an average of less than eight pigs per litter, from their three most recent litters. A computer could:

(1) Read a sow's production record (from the floppy disk on which it was stored after you typed it into the computer).

(2) Total the number of pigs weaned from her three most recent litters, and find the average number weaned per litter.

(3) Compare her average litter size with the number "8" and decide whether her average was greater or less than "8".

(4) Print out a message such as "cull sow number 103--averaged less than 8 pigs in last three litters" to let you know which sow or sows to cull.

Of course, all this work would be done by the computer's central processing unit, following the instructions contained in your computer program. For the computer to make culling decisions based on some other criteria--such as an "index" of litter size, weaning weight, number of functioning teats, etc.--the computer program would have to be changed.

Output Devices

So far we've discussed getting data into a computer, storing it in memory or on disk, and processing it. Once all that has been done, you must have some way of getting your processed data back out of the computer in a form that will provide useful information. You need an output device.

The most common output device is a display screen, also called a cathode ray tube (CRT) or monitor. Display screens are much like ordinary televisions. Some computers even let you use your own television as a display screen, thereby lowering the cash outlay needed to buy those computers. However, special-purpose display screens are more popular because they produce a sharper, clearer image of words and numbers, making them easier to read.

Output (the results from processing your data) can be displayed on a screen as words and numbers, as graphs and pictures, or as any combination of these. Some types of output--your financial statement, for instance--are best displayed as words and numbers. Other types of output are more meaningful when displayed as graphs or pictures. Commodity futures prices are a good example of data which becomes easier to visualize and understand when your computer displays them in chart or graph form.

Besides being used for output, a CRT screen also displays your typing. When you type on a keyboard the computer displays each character on the screen as you type it. That way you can see (on the screen) what you are typing, just as you would see (on paper) anything you typed on a typewriter.

Most CRT screens display either white lettering on a black screen, black lettering on a white screen, or green lettering on a black screen. Some computers come with only one type of screen, while others allow any of several optional screens. Color of the screen is not likely to be your most important purchase consideration; however, many people prefer green-on-black screens, believing they cause less eye strain than other types.

Some computers have the ability to do graphics in color. If you choose one of these computers and want to use programs which produce colored graphs and pictures, be sure you get a color CRT screen. Color CRTs are like color televisions, and are more expensive than black and white or black and green screens.

A printer is the next most important output device to have with a farm business computer, and in most cases is an absolute necessity: many accounting, crop, and livestock record programs will not work without a printer. Though you could use a pencil and paper to copy information from your display screen, that would put a lot of drudgery into using your computer--which is exactly what computers are meant to save you from.

The printing speed of commonly available printers ranges from about 30 to 180 characters per second (CPS). Your printer's speed becomes more important as the amount of printing you do increases. Slow printers are like a "watched pot

that never boils"--they seem exceptionally slow when you are waiting for your computer to finish printing something so you can do some other job. But the cost of printers increases with speed. Slower printers may cost just a few hundred dollars while the fastest printers cost $1 to $2 thousand or more.

Printers come with different line widths. Some print no more than 40 characters across a page, while others print as many as 132 characters or more. Again, your choice of a printer depends on the programs you plan to use, but many programs need a printer capable of printing at least an 80-character line.

Printing speed and print quality are two of the major factors determining any printer's price. Among the different types of printers, speed and quality vary considerably. Here is a short description of the common types of printers and their characteristics:

1. THERMAL and ELECTROSTATIC

Thermal and electrostatic printers are quiet, light-weight, and inexpensive. They print by heating or electrically charging special chemically-treated or aluminum-coated paper. So these printers do not have inked printer ribbons to replace, as most other printers do, but the special paper they use is more expensive than plain paper. A drawback of thermal printers is that their print may fade--or even disappear--over long periods of time. Either printer is adequate where a low volume of printing is to be done.

2. DOT MATRIX

Dot matrix printers are the most popular type. They are inexpensive, fast, and versatile--some can print graphics pictures, use multi-colored ribbons, etc. The printing in dot matrix printers is done by a group of small, hard wires spaced close together. To print a character, certain ones of the wires are made to strike an inked ribbon onto the paper. The character that is printed will be

made up of rows of black dots, corresponding to where the wires struck the ribbon. The quality of this print is equal to or better than that of thermal and electrostatic printers, but dot matrix printers have the advantage of using plain paper.

3. LETTER QUALITY

Letter quality or "word processing" printers have the highest print quality. They print by having a hammer or key strike an inked ribbon onto plain paper--just as a typewriter does. Many people value their print because a letter or other document printed on one of these printers cannot be distinguished from a hand-typed letter. However, letter quality printers are usually slower than dot matrix printers and are quite expensive.

Though display screens and printers are currently the most important output devices, there are many other kinds available--most of which will become increasingly important on farms in the near future.

We have already mentioned input devices that can gather information about mechanical processes on your farm--temperature sensors for grain bins and livestock buildings, ground speed indicators for tractors and other machines, soil moisture sensors for irrigation systems, etc. But even though these devices gather data and a computer processes it, nothing will be accomplished until the computer can somehow output the resulting information.

Of course your CRT or printer could be used for output. For instance, your computer could print a message on the display screen, such as "Turn on irrigation in southwest field," if data from soil moisture sensors showed a field to be too dry. But other output devices would make your irrigation system much more automated.

Output devices are available to turn electric motors and switches on and off, control hydraulic valves, open and close doors, or control nearly any other mechanical process. So an irrigation system can be completely controlled by computer--turned on, turned off, or stopped when a breakdown occurs. Similar devices allow ventilation fans and baffles to be operated by computer for accurate control of temperature and humidity in livestock confinement buildings. Or, aeration fans in a grain bin can be automatically turned on whenever grain temperature reaches a critical point, etc.

To use your computer as a management tool, though, you do not need to be concerned with these other output devices. For business planning, decision-making, and record keeping, a display screen and printer are all you currently need. But do be aware that more and more computer-controlled devices will be used on your farm in the future.

Also be aware that the computer you use for business purposes will not likely be the same one you use for controlling mechanical processes. Control devices currently on the market--grain bin monitors, livestock building warning systems, crop sprayer controllers, etc.--each have their own small computer: a central processor chip, memory circuits, and input and output devices. As long as CPU chips and memory circuits remain relatively inexpensive, process control devices are likely to have their own computer processors.

Communications

If record keeping and decision making are the major uses of computers on farms today, is it possible that something else will be more important tomorrow? Farm business computing experts believe that the computer's ability to gather

data and information from distant computers will soon become even more valuable than its ability to do record keeping.

A "modem" lets your computer communicate over telephone lines with other computers. Some modems have rubber earmuff-like sockets into which you place the handset of your telephone, while other types plug directly into a telephone wall receptacle. All modems work the same way though. They convert the audio signals that travel over phone lines into electronic signals understandable by a computer, and vice versa.

When a modem converts telephone signals into signals your computer can understand, it is receiving data being sent from some other computer. What about when you want to send data from your computer to that other one? That's when the reverse process takes place: the modem converts your computer's signals into audio signals that are sent over telephone lines to the other computer. The other computer must have a modem too, of course.

By now you may have realized that a **modem is an input/output** device, because it allows two-way communication between two computers. "Input" happens when your computer receives data from the other computer, through the part of the modem connected to the telephone earpiece. In a sense, when you listen to someone talk on a telephone you are receiving "input." "Output" happens when your computer sends signals to the other computer through the part of the modem connected to the telephone mouthpiece. When you talk on a telephone you are sending "output" to the person listening at the other end.

What kind of information will you be able to get by connecting with remote

(far away) computers? Currently, you can get up-to-the-minute futures market prices, news, government reports, weather reports, and other information. Plus, you may be able to use a much larger, more powerful computer (the one at the other end of the phone line) for solving problems too big for your microcomputer to handle.

Hardware Packaging

Computer design engineers have had as much freedom in designing the exterior of computer systems as farm equipment engineers have had in designing tractor hoods and cabs. Though microcomputers generally have the same components, those components do not necessarily look alike from manufacturer to manufacturer.

Any component mentioned can be combined with almost any other component, in the same enclosure. You will find that some computers have disk drives in the same enclosure as the keyboard, CPU, and memory. Others have their disk drives in a separate case. Some computers have a display screen in the same enclosure as the keyboard, while others use a separate display screen. Keyboards may or may not contain the CPU and memory, etc. Because of these variations microcomputers differ considerably in appearance.

SOFTWARE

Application Software

Computer programs that help you with management decisions, record keeping, and accounting are "application software." So are programs that keep lists of recipes, plan a food budget, teach math skills or a foreign language, or let your kids play any game from checkers to "Outer Space Invaders." Really, any program that helps you do some job or receive some benefit or enjoyment from your computer is application software.

The purpose of any application program is to control your computer so that it gets the proper input data for the problem you want to solve, stores the data, processes it, and outputs information that helps you with the problem. Here are types of application programs useful in a farm business.

Accounting programs are available for almost every computer on the market, and for almost any kind of accounting system--single-entry, double entry, cash basis, accrual basis, farm enterprise accounting, etc. These programs let you input records of farm business transactions, store those records, and print reports such as a balance sheet (financial statement), profit and loss statement, depreciation schedule, check register, etc. Some also help you do income tax planning or make budgets and projections--a month-by-month cash flow plan for next year, for example. Such "extra" reports help you get more management information from the accounting records you keep.

Specialized Record Keeping programs are available to help with many farm record keeping chores, but are most plentiful for livestock and field crop records. As with accounting programs, these programs let you input, store, and retrieve data. They also provide specialized management reports. Here are some examples: A sow record system may print a work schedule for the coming week, a list of sows needing to be pregnancy-checked, a list of sows serviced by each boar, and other reports. A crop record system may provide historic summaries of yields and fertilizer used on each field, print a list of fields where you used a certain herbicide, or calculate the average corn yield for all fields where you used a nitrogen stabilizer last year, etc.

Data Base Management (DBM) programs are very general, flexible programs that help you organize, store, and recall almost any kind of data. They can be used for most kinds of record keeping: accounting, livestock records, crop records, grain inventories, spare parts inventories, etc. However, a data base management program is not as simple to operate as a specialized program written for one of these tasks. By using a series of commands, you must describe to the DBM program the records you will be keeping and how you want to input them. You must also describe how you want those records to be processed (i.e., compute average yields for each crop on each farm you operate), and how you want printed reports and summaries to look.

One strong advantage of owning a data base management program is that its cost can be spread over several record keeping uses. (Specialized programs for accounting and the like usually have only one use.) The disadvantages are that

data base managers require more effort to learn how to use and may not be able to do extremely sophisticated processing of your data. A data base management program used for accounting, for instance, may be able to print a summary report of cash receipts and expenses but may not easily provide a report for end-of-year tax planning. You may need an additional program is you want that report.

Electronic worksheet or "spreadsheet" programs are probably the most versatile of all microcomputer programs, being useful for budgeting, business planning, math (they can be used like a calculator), and even for simple record keeping. A spreadsheet program can help with crop and livestock enterprise budgeting, cash flow planning, income tax planning, analyzing changes in the business (putting up another silo or buying more land, etc.), or for any job you would do with pencil, paper, and a calculator.

A spreadsheet program operates like a large sheet of paper in the computer's memory. On this "sheet of paper" you can type words, numbers, and mathematical formulas. The program instantly calculates the results of all your formulas on the "sheet of paper," and you can view the results on the display screen or print them on your printer. More importantly, all your formulas and numbers can be stored on a floppy disk.

Being able to save your worksheet on a disk allows you to reuse last year's corn budget, for instance, to estimate this year's cost of growing corn. You simply command the program to read the old corn budget from the disk. Then you change any numbers or formulas that will be different for this year's crop (i.e., fertilizer prices and amounts you plan to use) and command the program to print out a new budget. Of course this new budget can also be saved on a floppy disk, to be used next year.

Because spreadsheet programs are quite flexible they, like data base management programs, are more difficult to learn to use than most specialized programs. Before using a spreadsheet you must become familiar with the commands which control the program.

Word processing programs assist you in writing, correcting, and printing business letters and other documents. They let you type a document into your computer; reread it; insert and delete words, sentences, and paragraphs; search through it for any word or group of words; and print it on your printer. You can also save the document on a floppy disk to be used again later.

Word processors are real time savers because they let you change what you have typed without retyping the entire document. For example, assume you have used a word processor program to type a letter to your livestock feed supplier, explaining a mistake on your previous month's bill. After printing the letter you find that you forgot to mention your account number in the letter. If you had hand-typed the letter using a typewriter, you would either have to retype the letter or add the account number at the bottom of the page. With a word processor you could retrieve the letter from a floppy disk, correct it, and have it reprinted on your printer--saving lots of typing and making the corrected letter as neat as the original.

Many lawyers use word processors for storing contracts, leases, rental agreements, and other standard legal documents. A word processing program used on your own computer would give you the same capability--for storing and printing annual farm rental agreements and other documents you use periodically. Rather than retype a rental agreement each year, you would only need to change the items that were different from the previous year's agreement.

An important feature of word processing programs is their ability to print a document in many different ways; giving letters, etc., a professional and business-like appearance. Your documents can have automatically centered headings, right-justified text (words printed even with both margins of the paper--as a newspaper column is), boldface type, and other special print features.

Communications programs, themselves, do not provide you with farm management information. Instead, they can help you gather information by letting your computer communicate with other computers over telephone lines. A communications program contains computer instructions for sending and receiving messages and data through a modem.

A communications program can give you access to all sorts of information--commodity prices, news, weather reports, and more. Plus, you can use the programs and powerful computing ability of a large remote computer for solving large problems. In the future you may be able to sell or bid for livestock, grains, and other commodities by remote computer communication.

Remote computers are not accessible to everyone; most require that you establish an account with the company or institution which operates the computer, so that you may be charged for its use. Private companies are beginning to form for the purpose of providing computerized information for a fee. Several of these offer agricultural information.

Other programs are available for many specialized jobs; budgeting for the lease of land or machinery, or for the purchase of feeder livestock; maintaining depreciation schedules; calculating income taxes and deductions; projecting

livestock gain and feed consumption; and much more.

You could accomplish most of these tasks using a data base management program or electronic spreadsheet. However, as already mentioned, using data base management and spreadsheet programs requires that you spend some time learning how to use them beforehand. Though specialized programs are not as flexible (not suited to as many different uses) they may require less effort to use.

System Software

If application programs can do all the things mentioned so far, they should be the only programs you need, right? Well, not quite. Your computer must also have special programs to help it run your application programs. How do they help? The special programs provide instructions for operating the CRT, printer, and disk drives; reading and interpreting your application program's instructions; moving data around inside the computer; and doing all the other "housekeeping" chores that it takes to run a computer. These programs are called "system software." While it's not important that you become an expert on system software, you need to know what system programs do and why they are necessary.

Language Translator. Most application programs are written in a language which is easily understood by humans. Maybe you have heard of computer languages like BASIC, FORTRAN, COBOL, or Pascal. Unfortunately, these languages are not directly understood by computers. A language translator program is needed to convert them into "machine language"--the only language computers understand directly, without translation.

Why isn't every application program written in machine language, to save all this bother about translation? Writing machine language programs is considerably more difficult than writing programs in a higher-level computer language like Basic or Pascal. Machine language programs also take more time to develop and are not as easily modified for use on different kinds of computers. Machine language programmers must have a strong knowledge of the technical inner-workings of computers and of programming techniques. Writing programs in a language like BASIC, on the other hand, can be done by almost anyone after only a little training.

Two primary types of language translators are available: interpreters and compilers. An interpreter program reads your application program one line at a time. As each line is read it is translated, and the resulting machine language instructions are sent to the central processing unit. Compilers work in much the same way, except that a compiler program reads and translates your entire application program without sending any instructions to the central processor. Instead, they are saved on a floppy disk. Your computer then uses this list of machine language instructions from the disk instead of using the original application program.

An "interpreted" program runs a bit more slowly than a "compiled" program. However, more disk space may be required when compiled programs are used. There are several trade-offs involved in choosing between the types of language translators, but they are mostly related to programming ease.

What type of language translator do you need? That depends entirely on the application software you want to use. Many farmers have more than one translator--a BASIC interpreter and a Pascal compiler, for example--simply because the various application programs they have purchased require different translator programs. Almost every computer comes with at least one language translator--usually the most popular one for that particular computer. Additional translators may be purchased separately as needed.

Operating System. Though different application programs have different jobs, each uses your computer system in much the same way: they get data from the keyboard, move data around in memory, operate the disk drives, and print things on the display screen and printer. Because each application program would have to contain the same instructions for operating the various parts of your computer, computer designers put these instructions in a different set of programs, called an "operating system," in order to save space.

Operating system programs control and coordinate all parts of a computer. They contain the detailed machine language instructions which make the CPU, printer, disk drives, and other components function together smoothly, even though these components operate at different speeds.

An application program simply calls on the operating system programs to take care of jobs like reading and writing on floppy disks, printing on the printer, etc. This makes application programs easier to develop because they don't need

to contain the complicated system operating instructions. It also allows application programs to use less disk storage space. Each would be larger if it contained the operating system instructions.

You could say that operating system programs provide the "working environment" for all other programs that run in a computer. For this reason, your computer must have an operating system which is compatible with the application programs you want to run.

Most computers come with one operating system as standard equipment. Other operating systems are usually available though. Two different makes of computers using the same operating system can often read each other's disks, making transfer of programs and data easier. Increasing your computer's compatability with other computers also gives you more software to choose from. So if possible, choose an operating system that is available for several other computers besides yours--but only so long as it is compatible with the application programs you want to run.

The common computer jargon for operating system is "DOS", which stands for "Disk Operating System." One popular DOS which is available for most microcomputers is called CP/M (Control Program/Monitor).

Where to Get Software

Where do you get good farm software? You could write your own. Some farmers have successfully written good programs, but most either had prior computer training or spent considerable time learning how to program their

computers. And even an experienced programmer may need several man-months to write a useful program. Unless programming is one of your hobbies, you may find it too time consuming for anything other than simple problems.

Several public institutions--universities, etc.--have programs available. But many public programs are just converted versions of programs from large computer systems, and do not work efficiently on microcomputers. The quality of public software may be rising though, because more and more public software is being developed specifically for microcomputers. The main problem with most public software is that it is usually sold or given away "as is": no one may be available to help you learn how to use a program or to fix errors in it.

Quite a bit of microcomputer software has been sold by mail order software companies and as packaged off-the-shelf software by computer stores. This has proved to be an effective and convenient way to mass market software, but it may hold some pitfalls for you as a software purchaser. One problem--especially of mail order software--is that you may not have the opportunity to try out a program before you buy it. Very few companies permit you to return a program for refund if it contains errors or does not work as you expected.

Service may also be hard to get. Some mail-order software companies have no service personnel available for answering your questions. Buying a packaged program from your local computer store is no insurance of service either, because few dealers are intimately familiar with all of the programs they sell. Because of problems in the past though, many software companies are offering telephone numbers you can call for assistance and will work hard to help you use their products.

The largest dollar volume of farm software will likely be sold by dealers and custom programmers who can provide adequate service with their software.

Dealers and software companies who can advise you about buying hardware and software, train you in using their software, and modify programs to suit your needs are becoming more plentiful. Many of these companies sell a complete package of hardware, software, user training, and service. Software which is well backed by service is usually more expensive than that offered by companies which provide little service. But without an adequate backing of service, inexpensive programs may actually be more "costly" in terms of your time and frustration, if you have difficulty using them.

How is Software Sold?

Most software is sold on floppy disks or cassette tape. A fair amount of system software is sold on permanent, non-erasable memory chips (ROM memories, mentioned in the hardware discussion) which are included with a computer when you buy it. Almost no application programs are sold on memory chips.

Along with the disk or tape that contains the software should be some "documentation"--instructions that help you use the programs. Documentation may range from a typewritten page or less for some programs, to a complete operating manual for more complicated programs. Sophisticated accounting and record keeping software should come with a considerable amount of documentation. However, programs that print a lot of instructions on the display screen may not need as much documentation.

Some programs will also come with test data for you to use, to try the program out. By following examples in the program's documentation and using the test data, you may more easily learn how to operate these programs.

What to Look for as You Buy Software

Of the things to consider in buying a program, the first should probably be whether or not it is compatible with your computer system. As we mentioned earlier, almost every application program is designed to operate with a certain type of hardware, operating system, language translator, etc. Here is a list of the items you need to check, to insure compatability of a program with your computer:

* INPUT DEVICES -------- Some programs require a special type of keyboard or other special input device.

* MEMORY REQUIREMENTS -- Maximum memory required to run the program.

* STORAGE DEVICES ------ How many, what capacity, and what type.

* OUTPUT DEVICES ------- Type of display screen, and line width.
  Type of printer, and line width.

* LANGUAGE TRANSLATOR -- Your computer must have the same translator--and it must be the same version--as the one used by the program. Example: If the program needs JBASIC Version 2.1, your computer must have JBASIC Version 2.1--or you must buy it in order for your computer to be able to run that program.

* OPERATING SYSTEM ----- Must be compatible with both the applications program and the language translator program.

Next, you need to determine whether the program is easy enough for you to use and whether it will do the jobs you want done. If at all possible, try the program out before you buy it--at the dealers store, at the house of a neighbor who already owns the program, or in your own computer if the dealer will let you. Learning how to operate almost any program takes time, so give each one a fair chance before you reject it as "too hard" to use. Mainly, you should try to see whether the program's commands are simple and easy to use, and whether its documentation is adequate. Good documentation is written in layman's terms--not terms that only a programmer could understand--and gives a complete description of how to use the program.

Ask the person selling the program to refer you to several people who already use it. Talking to them may give you a good idea of how easy the program is to use, whether it performs as advertised, and whether it contains any serious errors. These people will also be able to give you their opinion of the

program's documentation, and of the company's service.

Finally, you should ask at least these five questions about the software dealer and his product:

1. How well has the program been tested? All software should be thoroughly tested before it is put on the market. However, some of it is not. The length of time a program has been sold is probably the best indicator of how well tested it is. Over time, people using the program in a wide variety of situations will find "buss" (errors) the programmer overlooked. Since most software companies continually upgrade their programs (in response to complaints and suggestions from users), later versions of a program are usually better than early ones.
2. What will the software company charge for program updates? As errors are found and corrected, and as improvements in a program are made, most companies make updated versions available to owners of old versions. Some companies provide these program updates free of charge, some supply free updates for a limited time after purchase, and some charge for all updates. The company's update policy is especially important if you are considering a new program--one that has not yet been well tested--which is likely to undergo several revisions.
3. Does the company have a software maintenance agreement? If so, what are the terms of the agreement? These questions are more important when you are considering custom-written or custom-modified software. If the company has agreed to fix program errors as you find them, or to alter the programs to suit your special needs, the terms of this agreement should be in writing. You should Know exactly what your and the seller's responsibilities are.
4. Are there any "hidden" charges? Prices quoted by a software dealer may not

include his charges for delivery, installation, instruction manuals, or for training you in how to use his programs.

5. Is the company reliable and easy to reach in case you have problems? Ask about the company's reputation for answering questions and solving problems encountered by users of their programs. Some companies are very accessible, offering telephone "hot lines" for problem troubleshooting, and/or quick response to mailed-in questions and problems. The length of time a company has been in business, the completeness of their user's manuals, and their reputation for quality software (well tested, easy to understand and use, etc.), provide hints about the company's willingness to service their product.

CAN I REALLY BENEFIT FROM USING A COMPUTER?

Learning to Operate a Computer

For a computer to "pay its way"--for it to become a useful farm management tool--you must use it. You cannot just leave it setting on your desk to collect dust. So before you buy a computer, you need to know whether you will actually use it or whether you will go back to pencil-and-paper records and decisions--because the computer seems "too much bother to learn." No one can tell you if you "have what it takes" to learn how to operate a computer. You must decide for yourself. But gone are the days when you had to be a genius to operate a computer. Today's computers are simple enough for children to use.

Learning how to program a computer however, is no simple task. But if you are a farmer, you don't have time to become the world's greatest computer programer, anyway. Your main concern will be to learn just enough about computers to let you operate the programs that other people have written. Did you design the tractors and implements you use? Probably not, but that hasn't stopped you from using them, has it? The same is true of computers. You do not need to be a programmer in order to use a computer to do useful work.

How do you learn to operate a computer? There are several ways. The easiest is to get some "hands-on" experience. Go to a computer store or to a

friend who owns a microcomputer, and have them show you how to run some of their programs. This will give you a feel for typing data into a computer, and for reading things from a display screen. If you have not typed anything for a long time, or have never typed, don't be too concerned. Most farmers who own computers end up being pretty fair "hunt-and-peck" typists after only a couple months of using a computer.

Another way to learn about operating a computer is to ask several computer owners how they learned to operate theirs. You may be surprised to find that most of them learned to operate their computer by just reading the manuals that came with it, and by following the instructions that came with the programs they bought. Don't be intimidated by the technical manuals that come with many computers. They are mostly meant for programmers. Simple, easy-to-read manuals are available which provide step-by-step instructions for using a microcomputer--even telling you how to plug it in and turn it on.

Farm software and hardware dealers may also be a good source of help. Some dealers are willing to lease or loan computers and programs for a trial period, to let you see if you can learn to use them before actually making a purchase. And many dealers offer training sessions and/or provide personal training with each computer or program they sell.

Fitting a Computer to Your Management Style

Assuming you can develop the simple skills necessary to operate a computer, what else do you need to know? One important question you should ask yourself is, "Will a computer 'fit' with my style of management?" For most people, using a microcomputer to organize farm business records and other management information requires some getting used to.

No computer has the ability to turn you into a record keeper. If you are not already accustomed to collecting, recording, and analyzing farm management data (sow records, crop records, etc.), don't think that buying a computer will automatically get you into the record keeping habit. If you are someone who already keeps good records though, and you would like to have better records, a computer may help you be more disciplined about record keeping. Of course, a computer cannot force you to be more disciplined, but it may make you more eager to regularly collect and record data.

How can a computer make you more eager to keep records? A computer will take care of the big job of organizing, storing, and summarizing your records. Your major effort will be spent in collecting data from your farm operations. Getting management information from that data will not require a lot of extra time. And if you believe the extra management information will be valuable, you won't mind spending extra time collecting data.

That's an important point. Farm computer owners often find that they keep more detailed records using computers than they did by hand. The information they get from these detailed records would be just as valuable if the records were kept by hand, but the cost of getting management information from a manual record system--in terms of time needed to summarize and analyze the records--is often more than the information was worth.

It is also important to emphasize that improved management information in the form of more complete records is not "free." Besides the cost of owning and operating a computer, the value of your time spent collecting extra data must be considered. You should also realize that computerized analysis of records or of almost any problem can require more complete data than you might need to do the same analysis yourself. More complete data? Yes. A computer cannot guess at missing numbers or use past experience and "seat-of-the-pants" estimates, as you might, to arrive at an answer.

You may have heard that computerizing your records will reduce the amount of time you spend keeping records. In some cases that's true, especially when a manual record system is simply converted into a computer program, without making changes that take full advantage of the computer's capabilities. But few people notice a decrease in the amount of time they spend keeping records with a computer.

One reason for this is the extra time you will spend collecting data if you do keep more detailed records than you kept by hand. Another reason is that you may find yourself spending more time studying the information gleaned from your records. Because a computer can summarize and analyze records in many different ways you may be faced with a variety of useful reports to examine.

Depending on how you think of it, you might say that the time you spend

examining your records and other management information is "management time" instead of "labor." A computer may decrease the labor involved in keeping records, but will probably cause you to use more of your time for management. But because computers do the work of summarizing your data, you may spend your management time more efficiently. For instance, it might take less time to study a printed summary of your most recent farrowing's sow statistics than to shuffle through a box of 150 sow record cards.

Having detailed records and a computer available to process them brings up another management consideration. You must have a basic understanding of how the computer processes your record data to make sure that you 1) have supplied the right data, and 2) understand what the results mean.

For instance, consider a program that calculates least-cost feed rations. The program will only calculate a ration using the feedstuffs, feed prices, and ration requirements (for protein, energy, etc.) you have told it to consider. What if it calculates a ration that contains 50 percent salt? You clearly wouldn't use the ration, because past experience tells you that it contains too much salt. Do you just assume that the computer made an error, and quit using the program? No. You must understand that once the ration requirements are met, some ration programs complete a ration using the least expensive feedstuff. If salt happens to be the least expensive feedstuff available, then that's what the program will use to fill up the ration. To correct the problem you simply limit the amount of salt in the ration requirements, or add another feedstuff less expensive than salt for the program to consider. In other words, your understanding of how the computer solves a ration problem assures that you supply the right data, and that you interpret the results correctly.

Benefits of Using a Computer

One of the hardest decisions in buying a computer may be figuring out whether the benefits you get from having one will justify its cost. You can think of benefits as being divided into two categories: 1) reductions in the cost of jobs you currently do, and 2) increases in the value or income you receive from other jobs.

The cost of a record keeping service that you would no longer need if you had a computer, or the value of your own time that a computer may save, are good examples of how a computer may reduce your costs. Estimating such measurable cost reductions will let you come up with a rough idea of your annual savings due to computerization. But any estimate of savings can be misleading. During your first year of using a computer you may spend as much time learning how to use it as you usually spend just for keeping records.

The value of intangible (not easily identified) benefits you get from using a computer may not be apparent until after you have used it for a while. Even if you knew of all the potential benefits before you bought a computer, comparing benefits with the computer's cost would not be much easier, because placing a dollar value on the benefits is a difficult job. What sorts of benefits can you expect? Here is a list of items that many farm computer users have noticed as being valuable results of using a computer:

* More detailed management information.

* More timely management information. Having your own computer can improve the turnaround time between recording records and getting them back in a summarized form that provides useful information. A computer also improves the turnaround time for analyzing many problems, such as calculating a least-cost feed ration, preparing a crop budget, or computing your average corn yields.
* Management information and decisions more tailored to your own situation--not to the "average" for farms representative of your farm type.
* More detailed analysis of records and farm management problems. Because the computer does the difficult calculations, you may attempt methods of analysis that you would not otherwise try if you had to do them with pencil and paper.
* Increased opportunity to do forward planning. Because computers do calculations quickly, you can look at many different plans and situations--rising or falling crop prices, higher or lower feed conversion rates, etc.--in a short time.
* Decreased drudgery in record keeping. Much of the time-consuming and boring work of record keeping is removed.
* May help you be a more disciplined record keeper.
* Improved business image. Neat, professional-looking business letters, a good set of records, and detailed forward planning and financial analysis can help build your image as a skillful farm manager.

Not everyone places the same value on these benefits, and not everyone gets the same level of benefits from using a computer. In general, the larger your operation, the more likely you are to receive substantial benefits from using a computer. But many other factors also affect the level of benefits you would

receive, on your particular farm. One is the type of farm you operate. Some farm types--large swine units are a good example--simply have a great need for detailed production information. Another factor is your own background, experience, and goals as a farm manager. To some people, complete records and detailed methods of farm business analysis are not important.

SEVEN STEPS IN BUYING A FARM COMPUTER

If you feel that a computer might be worth looking into, where do you start? How do you begin to tackle the big problem of learning more about computers, and choosing one for your operation? Most of the decisions related to buying and using a computer are interrelated: the programs you want to use determine what type of computer, printer, etc. you need. So don't think of the following list of steps as being entirely separate. Think of them as a general guideline for the order in which you need to consider the various aspects of buying a computer for your farm.

1. Get Familiar With Computers

Before you can make any accurate decisions about buying either programs or a computer, you need to have a good idea of their capabilities. You should try to get as familiar as possible with computers and how they are used. Use every opportunity to get "hands-on" experience. Attend farm computer conferences held by universities and private companies. Talk to farm software dealers, computer dealers, and farmers who have used a computer for some time. You might also subscribe to one or more of the magazines and newsletters that deal with farm computing.

2. Decide Exactly What You Want to do With a Computer

This may be the most important part of going about buying a computer, because unless you know exactly what you want to do with it, you may end up with a computer and programs that do not suit your needs. Will it be keeping accounting records? Crop production records? Livestock records? Do you want to use it for financial planning, etc.? Remember that YOU--not the computer--must decide what you want the computer to be able to do.

How much detail do you want to keep in these records? To some people "field records" means keeping track of the fertilizer used on a field, and of the crop's yield. But to others, "field records" means detailed accounting of the costs and returns on each field; historic records of soil tests, fertilizer applied, weather, and yields; notes on tillage methods used; or something more. The amount of detail you want is most important in determining what programs you buy.

Before going to talk to your local computer dealer or farm software dealer, you need to make a list of all the things you might want to do with a computer. Here is an example list, dealing with sow records:

I want to keep farrowing statistics and lifetime production records for a herd of 150 sows, including:

(a) sow's I.D. number

(b) sow's breed and pedigree

(c) sow's birth date

(d) her production history:

- number of litters farrowed
- number of live, dead, deformed pigs farrowed each litter
- comments about farrowing difficulties

- reasons for pig death losses

- number of pigs weaned

(e) her most recent breeding date

(f) ear tag number of the boar used for most recent breeding

(g) the next date on which sow should be pregnancy checked

(h) predicted farrowing date

3. Find Software Capable of Performing the Jobs You Have Decided On

Notice that this step was placed before the steps dealing with buying computer hardware. Because programs determine what tasks a computer will be able to do, it is important that you consider the programs you want to use before deciding what computer to buy.

Locate as many sources as possible for the types of programs you need. Computer dealers and advertisements in farm computer publications may currently provide the best information about companies to contact for farm programs. The more programs you locate, the more likely you are to find a program that closely suits your needs.

Next, gather as much information as you can about each of the programs. You need to determine how closely each one fits your list of objectives. Talk to people who are currently using the programs you're considering. You should also see the program demonstrated if possible--either by a dealer, or by someone who owns the program.

Choosing between several programs that are similar may not be easy, especially if each one has most or all of the capabilities you want. But you should be able to narrow your choice down to just a couple of programs for each

category of software you need--data base management, accounting, crop records, etc.

4. Examine the Computer(s) Which Can Operate Your Software Choice(s)

Next, you need to look at the computer or computers capable of operating the programs you have chosen. Because a couple of programs in each software category may suit your needs, you may be faced with several possible combinations of computer hardware and software. Some of these combinations may be "package" systems--complete computer systems with programs included.

At this point you should gather information on the cost of the various computer systems you are faced with. Be wary of the cost comparisons that dealers make. Even an honest dealer may compare "apples with oranges" when he compares the capabilities of his system with that of other manufacturers. If you can find someone who knows a bit about microcomputers, ask them to help you compare the computer systems you are considering--but realize that most computer owners have as much brand preference as tractor owners do.

Above all, don't forget that the most important part of your purchase will be the software--programs which will make the computer do the jobs you want done. Make sure the application programs you want to use will work on the computers you examime. Also, ask if the proper operating system and language translator programs are available, and whether the ones you need are standard equipment or would have to be purchased separately.

5. Consider Future Uses of Your Computer

Your immediate plans may not include some uses of computers that you might like to have in the future. For example, you may not yet wish to have a modem for communicating with other computers over telephone lines. But next year you may want your computer to have that capability. So as you investigate the computers that are available, ask about the other types of hardware and software that will work with them.

Most microcomputers can use all the popular hardware devices--modems, digitizers, etc.--but in some cases extra electronic circuitry must be added before any of these devices can be used. So you should ask what the total cost of adding a modem, etc., would be, including any additional necessary hardware.

6. Check On the Availability of Maintenance for Both Hardware and Software

Whether you are talking about computers or other farm equipment, the distance you live from a dealer who can service your equipment is an important purchase consideration. Establishing a good relationship with a local dealer may hold several advantages for you, including better service and better turnaround time on servicing. Remember that prices charged by mail-order hardware firms usually include very little service, so they may be lower than prices charged by your local dealer. But when your computer needs to be serviced, don't expect your local dealer to be eager to service hardware purchased from a mail-order house.

You should also consider whether you will be able to get service on the software you purchase. Custom-written software is best purchased with some guaranteed amount of service, from a company that is close to your area. Otherwise you may not be able to make program changes to suit your operation, or

to fix program errors if any are found.

Service may be more difficult to get for mail-order and packaged off-the-shelf programs, but they should not be avoided for that reason alone: some of the best software is sold by mail, and off-the-shelf by computer dealers. One substitute for the software company's service is contact with farmers or others in your area who are currently using the programs you want to use. These people can give you valuable advice about how to use a program, and may be willing to help if you have problems.

The same is true of computer hardware. You may be wise to buy a brand of computer that is popular in your area, because other computer users may be one of your better sources of information. By answering questions and helping you learn to use your computer, they may partly substitute for a dealer's help.

7. Choose the Combination of Software and Hardware that Meets Your Objectives At Lowest Cost

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Actually making a decision is your final step, of course. If you carefully follow the first six steps, you will have a fair idea of the types of computers and programs that are available. You should be able to choose a computer and programs which meet your needs at lowest cost, yet allows for future expansion of uses.

Compiled by Eric Maloney

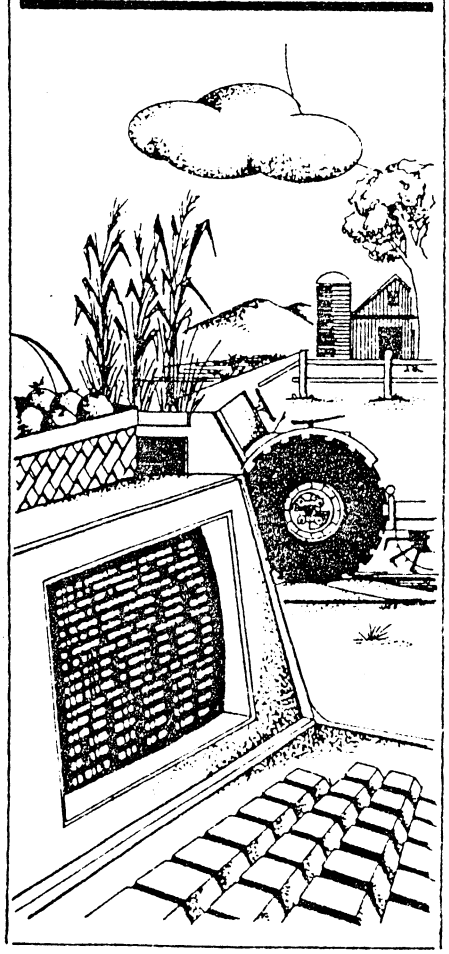
Old MacDonald Had a Micro

And He's Using It To Call Up Videotext Services

Harvesting Data

Farmers, agriculturists and extension agents in the U.S. and Canada are making use of several specialized videotext services now on-line.

These services can provide a wide range of information, from current market statistics to encyclopedic data on crop pests. They include the Kentucky Cooperative Extension Service's Green Thumb project, Instant Update from Professional Farmers of America in Cedar Rapids, IA, Elanco's Agrivision, Project Grassroots in Manitoba and SCAMP in New Hampshire and New York.



While they vary in size and scope, all use videotext technology, transmitting data via telephone line to a terminal or microcomputer.

The most popular type of videotext service so far is based on the Green Thumb project at the University of Kentucky. For that pilot test, Radio Shack developed a keypad which eventually evolved into the Radio Shack Videotex terminal. The project now also uses a TRS-80 Model II to collect and transmit data. The system has been adapted for use by Instant Update and Agrivision.

The initial phase of the Green Thumb project ran from March 1980 to December 1981. In January the Kentucky Extension Service moved into phase two, which was to establish Green Thumb as a permanent service. At first, some 200 farmers in two counties were able to access the service. In phase two, the service has been opened to the entire state.

Users can retrieve information in 17 categories, which include weather, market news, county news, pest management, agriculture economics, animal sciences, entomology, forestry, horticulture, plant sciences and veterinary medicine. The market and weather information is updated automatically; other categories are updated weekly or monthly.

The system consists of a TRS-80 Model II and an eight-line multiplexer. The service is free, except for phone charges. Eventually, different parts of the state will have their own store-and-forward units, thus allowing farmers in each area to access the service with a local call.

While the Cooperative Extension Service provided the keypads for the pilot, farmers will now have to buy their own terminals or microcomputers. John Ragland, assistant to the director, says that software is available for the TRS-80s, the Apple and the TI 99/4.

Ragland expects that about one-third of the initial users will stay with the system, with perhaps a total of 200 users by next July. That number could multiply two or three times by mid-1983.

Instant Update

Instant Update is modeled closely after the Green Thumb project, and is the first commercial pay-as-you-go farmers' videotext service. It serves largely the Midwestern farm states, although it has subscribers in nearly all 50 states.

The core of Instant Update is an electronic newsletter that provides such ephemeral information as market news, commodity prices, marketing tips and the weather. Its features include:

- current future prices for grains, livestock, cotton and gold;
- a cash market scan that tracks the difference between cash and futures at key points for major crops;
- price chart trends;
- Washington Watch, for news from Pro Farmers' Washington bureau;
- a commodity-by-commodity summary of Pro Farmers' marketing plan;
- current recommendations on market tactics;
- local, national and world weather.

Instant Update currently has some 600 subscribers. "We consider that to be pretty good, even though it's not what we'd hoped for," says Marketing Manager Stewart Cross. Subscribers pay $95 per month, plus toll charges. Cross says

and spends about $30 a month on phone calls.

Instant Update subscribers originally were able to access the service only with a Radio Shack terminal. Pro Farmer has since developed software for the Apple, and is working on software for the TRS-80s.

Similar to Instant Update—in fact, Pro Farmer provides the editorial material—is Agrivision. Agrivision is provided by Elanco as a service to buyers of its herbicide treflan. Farmers who buy at least 250 gallons a year receive a terminal similar to the one used by Instant Update. The information, while similar to Instant Update's, is geared toward soy bean and cotton farmers in the South. So far, some 2000 units have been installed.

Except for phone charges, the service is free. Elanco provides the database partly to support its image as a "leader in innovation," says Roger Benson, manager of managerial services.

"Hopefully we'll gain a certain amount of market loyalty," he says.

Canada's Telidon system made its agricultural debut in mid-1981 with Project Grassroots in Manitoba. Growing out of the Project Ida field trial in South Headingley, near Winnipeg, Project Grassroots is a joint undertaking of InfoMart and the Manitoba Telephone System.

The project started off with 25 terminals in such public places as the offices of grain elevator operators, crop insurance agents and agricultural agents. It has since expanded to include 25 farm homes and 25–30 commercial subscribers, and InfoMart Branch Manager Bruno Leps hopes for 500 more terminals by early 1982 and 1500 more during the year after that.

Project Grassroots includes some 3500 pages of agricultural information. Included are the Winnipeg Commodity Exchange; the World Weatherwatch; information on home economics and farm safety; Current Focus, a service to provide regular updates on the market outlook for grain, livestock, dairy and poultry producers; the Herald Grain Newsletter, on grain industry activities for the week; statistical reports from the Canadian Grain Commission on the supply and movement of Canadian grain; and information on livestock markets.

To access Project Grassroots, the user needs a Telidon keypad, developed by Norpak, and the Telidon terminal from InfoMart. The user pays $47 a month for the terminal on a two-year lease, and pays five cents a minute for telephone charges. Leps says that the average user spends ten to 20 minutes a day on the system, with monthly charges coming to about $80.

One of the outstanding characteristics of Project Grassroots is its graphics displays. Grassroots pages often include colorful illustrations, charts and maps.

others in that it is currently geared primarily toward extension agents, agriculturists and foresters. It provides pest and crop management information, which is routed through the state extension agencies to the farmers.

The New Hampshire SCAMP program has some 60 users, most of whom are extension agents, University of New Hampshire personnel and foresters. But, says UNH Extension entomologist James S. Bowman, the long-range plans are to include individual farmers.

"There's no reason why a farmer couldn't hook up to the system if he had a coupler and terminal," he says.

The two most important features of SCAMP are its electronics bulletin board system and its library. The bulletin board includes field reports from SCAMP users on current pest problems and recommendations on how to deal with them. The library includes the life histories of a variety of crop pests, and information on their control.

Bowman is pleased so far with the system's development.

"The mechanics are good, and the software is fine," he says. "We just have to get people to use it more. The younger extension agents are embracing it, but some of the older agents are a little hesitant."

Market Strategies

To whom are these systems geared, and what is the potential market?

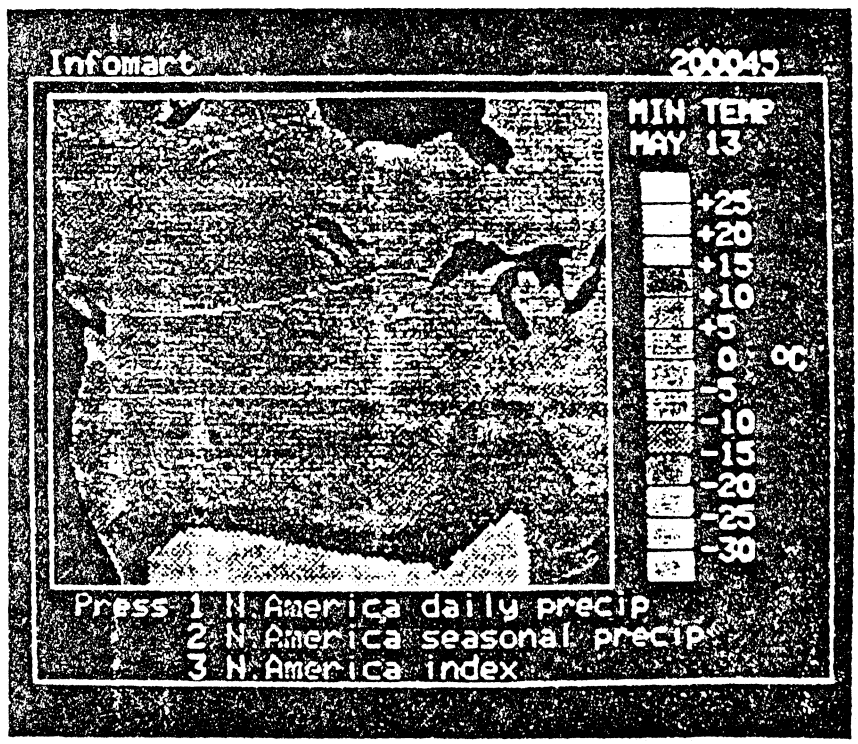
So far, the commercial services are appealing to owners of larger farms. The average, runs a 700–800 acre farm, substantially above the national average of 430 acres, and spends about $125 a month on the service. Elanco subscribers receive the service free, but the 250 gallons of treflan they buy costs over $6000 and is enough to treat 1000 acres. Bruno Leps says that Project Grassroots, too, is geared toward the larger farmer.

"This is not to say that there's not a market for others," he adds. "But we're going to have to bring the price down first."

The cost, however, is not the major factor, says Green Thumb's John Ragland. The costs for a terminal are within the reach of even the small farmer. "But you have to have some size before you start trading grain and livestock," he says, noting that marketing information is the most-used service of Green Thumb.

"It doesn't have to be the case that we're used only by larger farms," he continues. "If we get a bulletin board system, if we're imaginative and aggressive, we could come up with a service of value to small farmers, too."

Nevertheless, it is true that many small farmers are currently struggling for survival. According to figures from the U.S. Department of Agriculture, 102,000 farms have shut down in the U.S. since 1975, though the average size has increased from 420 to 430 acres. Many small farmers might not be willing to pay for a service like Instant Update, when they can get much of the same information in periodicals, on the radio and through the local extension agent.



A page from Project Grassroots, an agricultural videotext service in Manitoba, Canada.

ing magazine of its readership shows that 31 percent of those questioned are not interested in a videotext service. Some 41 percent said they are somewhat interested. Only 27 percent said they are interested or very interested. While this figure translates into some 650,000 potential subscribers—more than enough to make services like Instant Update commercially viable—it indicates that the majority of farmers will continue as they have for a while longer.

Bringing down the costs of videotext services will no doubt help. As Ragland points out:

"Farmers have traditionally had technology and information provided in fairly good quality and quantity for low cost, through extension agencies and the federal government. It's a fact that leads me to believe that we should look at alternative means of providing the information without charging the farmer a user's fee."

Several ways of doing this present themselves. Some companies could go the route of Elanco, offering videotext services as premiums to customers. Another possibility is sponsorship of databases by commercial businesses, an option Green Thumb is considering.

"For example, it might be a local county bank," Ragland says. "They may support a service in exchange for a page of information on their interest rates or services. It may be that there might have to be advertising, or at least recognition of sponsorship."

We should look at alternative means of providing the information without charging the farmer a user's fee.

Finally, extension agencies might act as clearinghouses for farmers in their area, as is the case with SCAMP. Farmers would call their local agent with questions, and the agent would access the information from the host computer.

Until the costs decline and services become accessible to a broader range of farmers, videotext services will be scrambling to convince their potential market that they have a valuable product.

"Videotext is limited by how good the information is," Roger Benson of Elanco says. "As long as it's expensive to access the information, it has to be worth the customer's while."

—Eric Maloney

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=>VEGETABLE
 HOW MANY DAYS TO REPORT?
=>7
08/ 12/ 81  FROM: NEWSLETTER
TO: FIELD

FROM 8/11/81 INSECT NOTES

   VEGETABLES
(Bowman, Eaton)

Cole Crops:  Cabbage looper MOTH CATCHES IN PHEROMONE TRAPS ARE STILL
ZERO ON DOVER POINT BUT ARE INCREASING TO ABOUT ONE PER DAY IN
STRATHAM.  STILL NO APPARENT BUILD UP OF LARVAE.  SCOUTING HAS
DEMONSTRATED AS HIGH AS 56% OF THE PLANTS WITH AT LEAST ONE WORM
WHICH IS PREDOMINANTLY THE Imported cabbage worm.  AN UNEXPECTED
ATTACK BY Japanese beetles ON COLE CROPS OCCURRED ON DOVER POINT
THIS WEEK.

Potatoes:  Colorado Potato beetle HAS BEEN SLOW BUILDING UP IN
COMMERCIAL PLANTINGS SO FAR.  PYDRIN HAS ELIMINATED MOST OF THE
PROBLEM BUT WE HAVE NOTICED A SLOW BUILD UP IN UNTREATED AREAS
ALSO.  THIS IS PROBABLY DUE TO THE EXCELLENT GROWING CONDITIONS
THIS YEAR.  NO PROBLEMS WITH aphids or potato leafhopper SO FAR.

Sweet corn:  SINCE OUR INITIAL CATCHES OF corn earworm and fall
armyworm MOTHS REPORTED LAST WEEK, WE HAVE FOUND NO MORE OF EITHER
SPECIES.  A COUPLE OF EARWORMS WERE TRAPPED AT THE SUBURBAN
EXPERIMENT STATION (WALTHAM, MASS.) THIS WEEKEND.  GROWERS WITH
LIGHT TRAPS MUST BE SURE THAT THE TRAPS ARE KEPT CLOSE TO FRESH
SILKING CORN, IF EARWORM CATCHES ARE TO BE RELIABLE.  European
corn borer CATCHES ARE STILL HIGH.  WE STILL RECOMMEND ABOUT A
6-DAY SCHEDULE FOR SILKING CORN, BUT THAT CAN CHANGE IF earworm
or fall armyworm COUNTS INCREASE.

END
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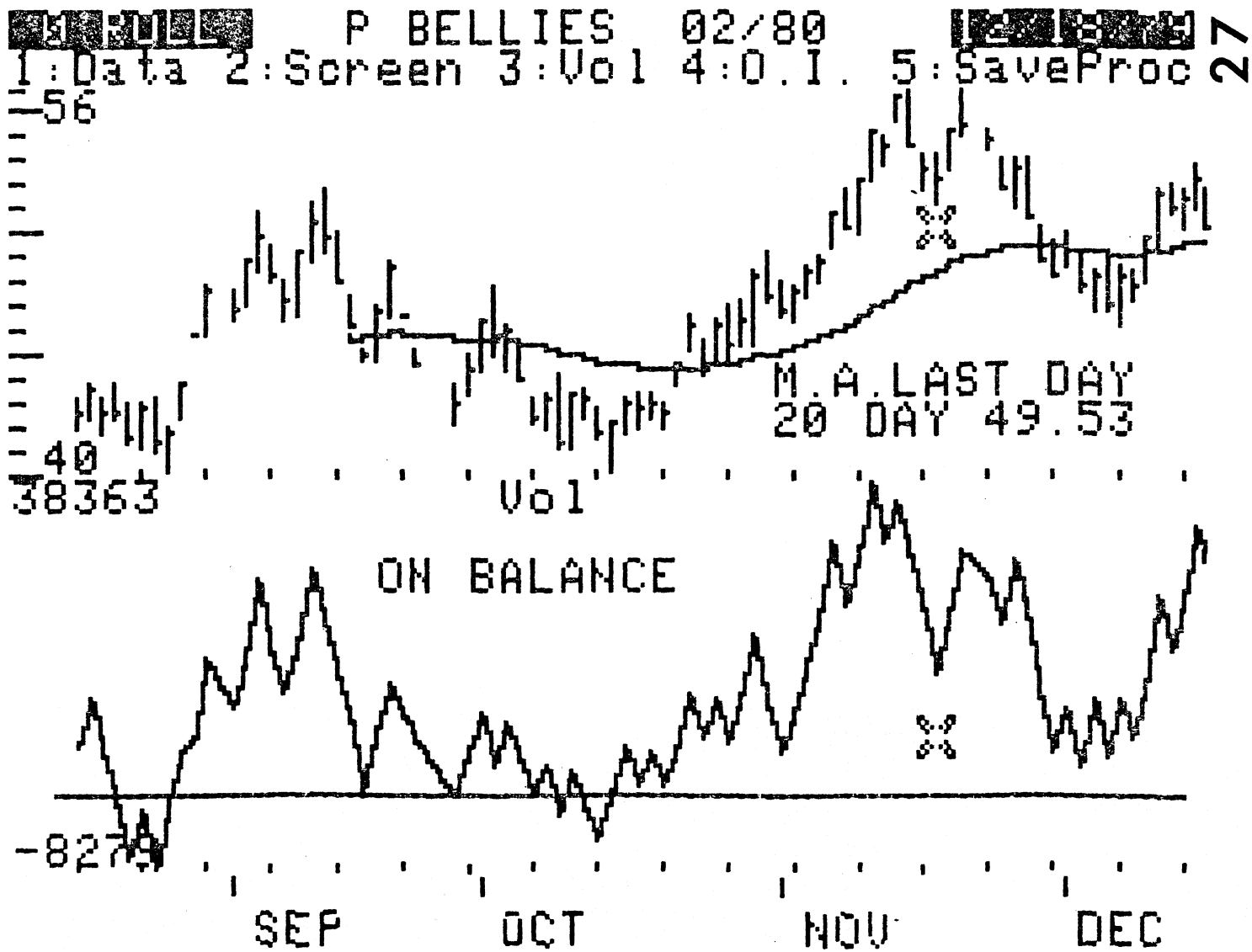
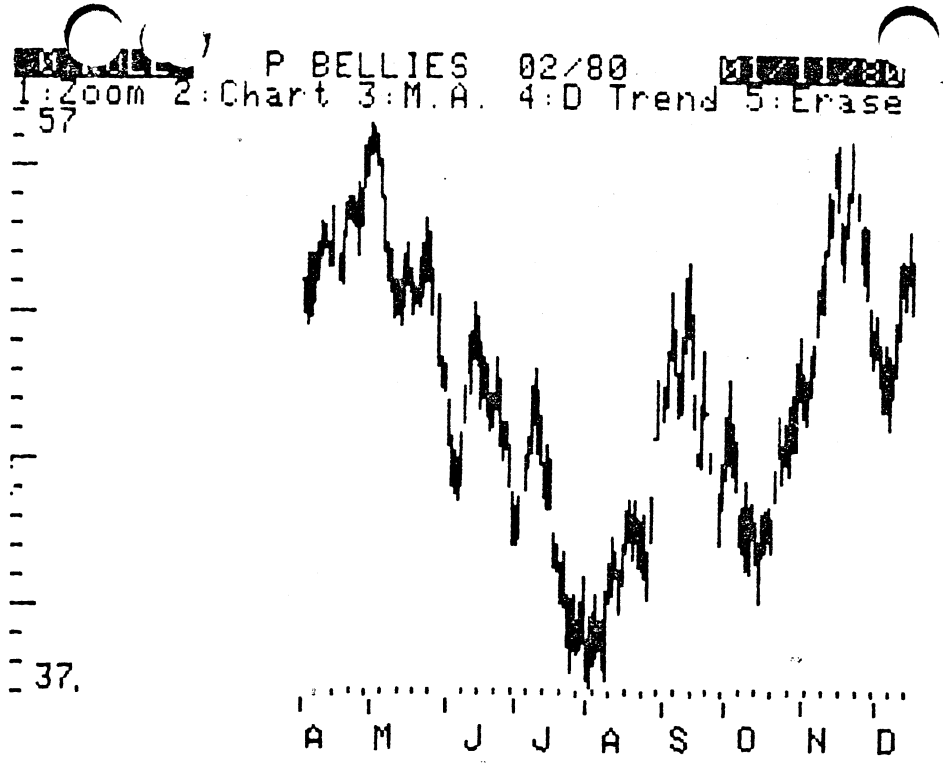
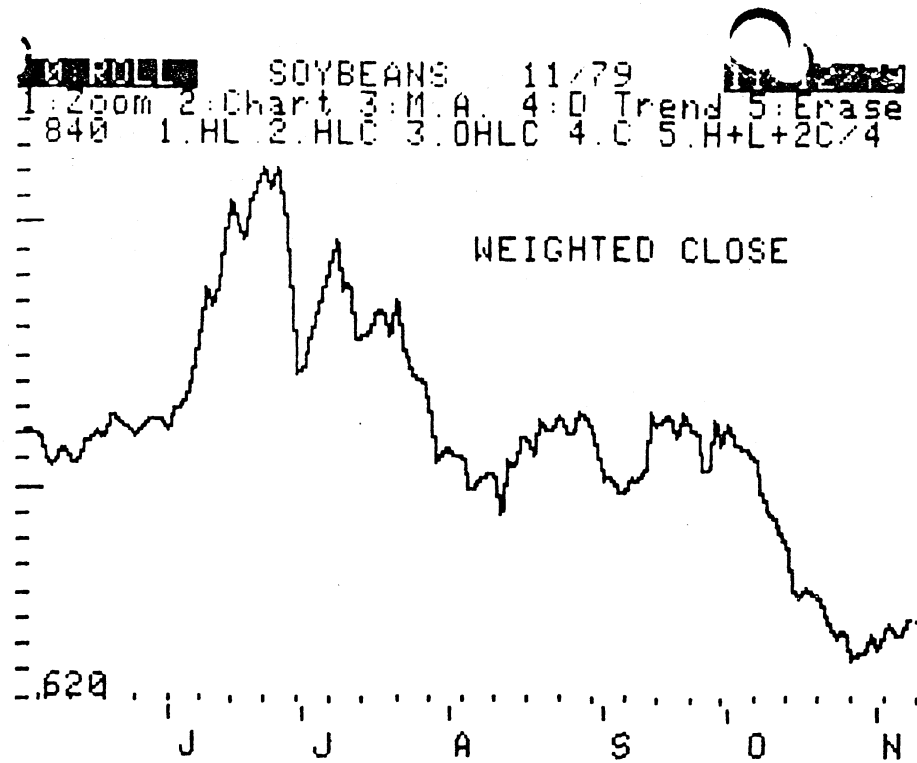
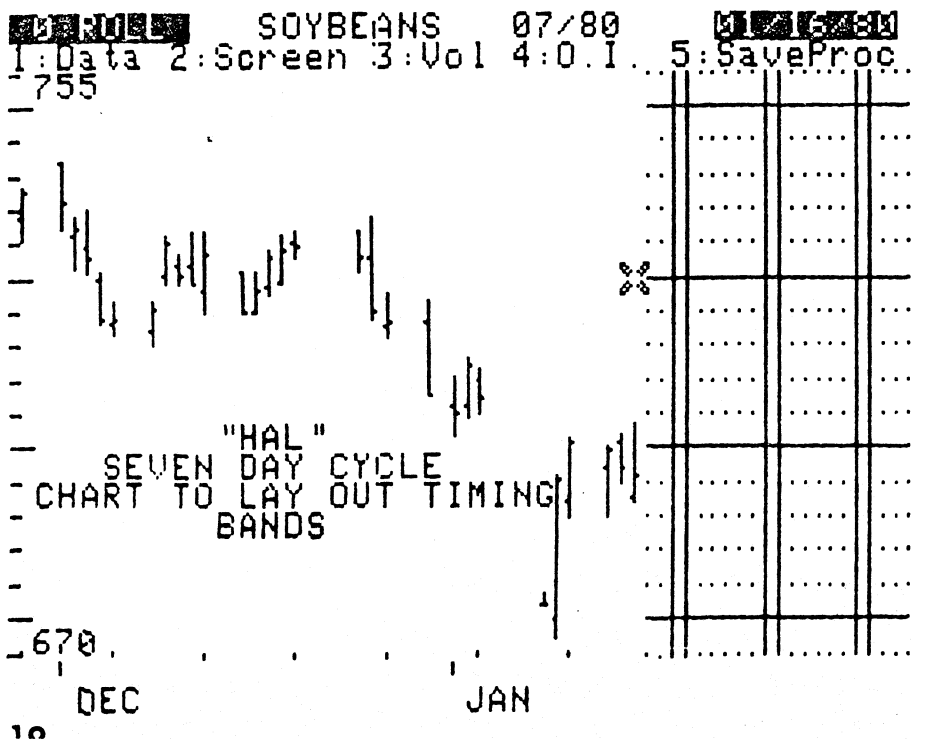
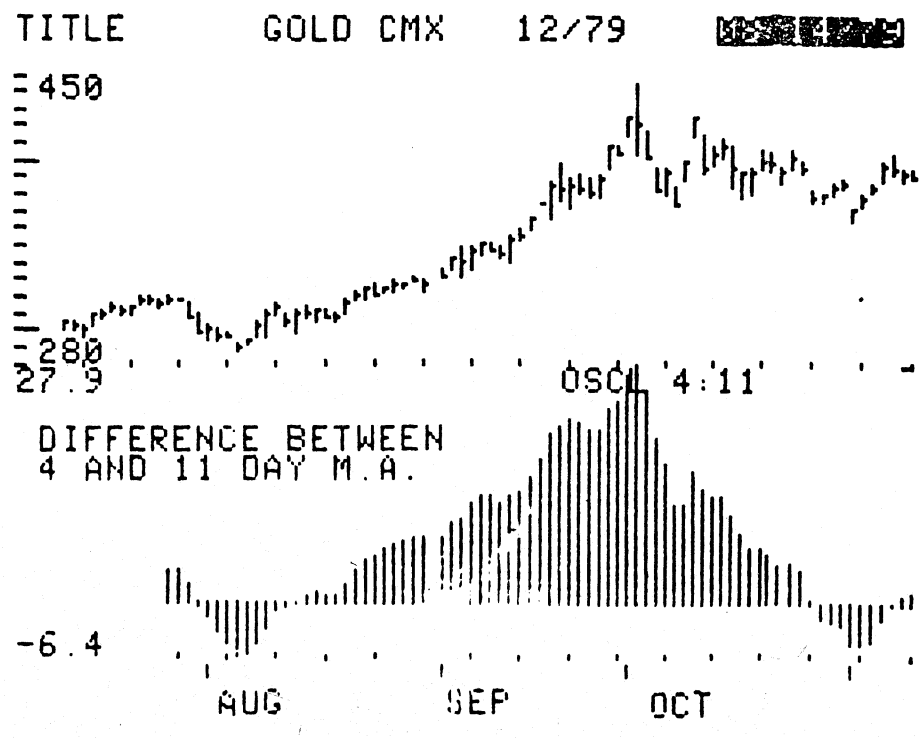
From the electronic bulletin board of the University of New Hampshire's SCAMP system.


P BELLIES 02/80
1:Data 2:Screen 3:Vol 4:O.I. 5:SaveProc
27
56
40
M.A.LAST DAY
20 DAY 49.53
38363
Vol
ON BALANCE
-827
SEP
OCT
NOV
DEC


P BELLIES 02/80
1:Zoom 2:Chart 3:M.A. 4:D Trend 5:Erase
57
37.
A M J J A S O N D

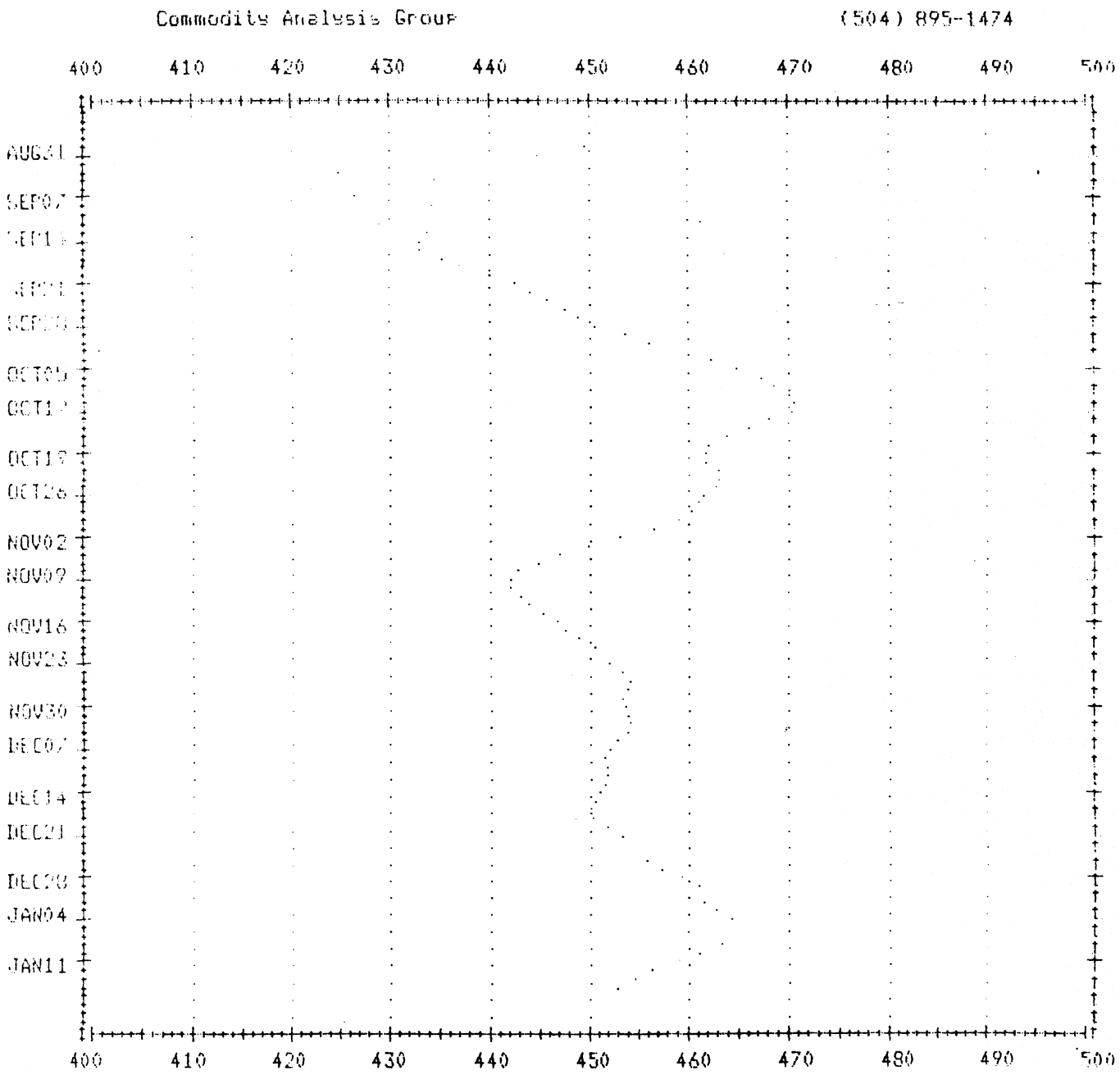

SOYBEANS 11/79
1:Zoom 2:Chart 3:M.A. 4:D Trend 5:Erase
840 1.HL 2.HLC 3.OHLC 4.C 5.H+L+2C/4
WEIGHTED CLOSE
620
J J A S O N


SOYBEANS 07/80
1:Data 2:Screen 3:Vol 4:O.I. 5:SaveProc
755
"HAL"
SEVEN DAY CYCLE
CHART TO LAY OUT TIMING
BANDS
670.
DEC
JAN


TITLE GOLD CMX 12/79
450
280
27.9
OSC 4:11
DIFFERENCE BETWEEN
4 AND 11 DAY M.A.
-6.4
AUG
SEP
OCT

WHEAT 07/80

10 DAY M.A.

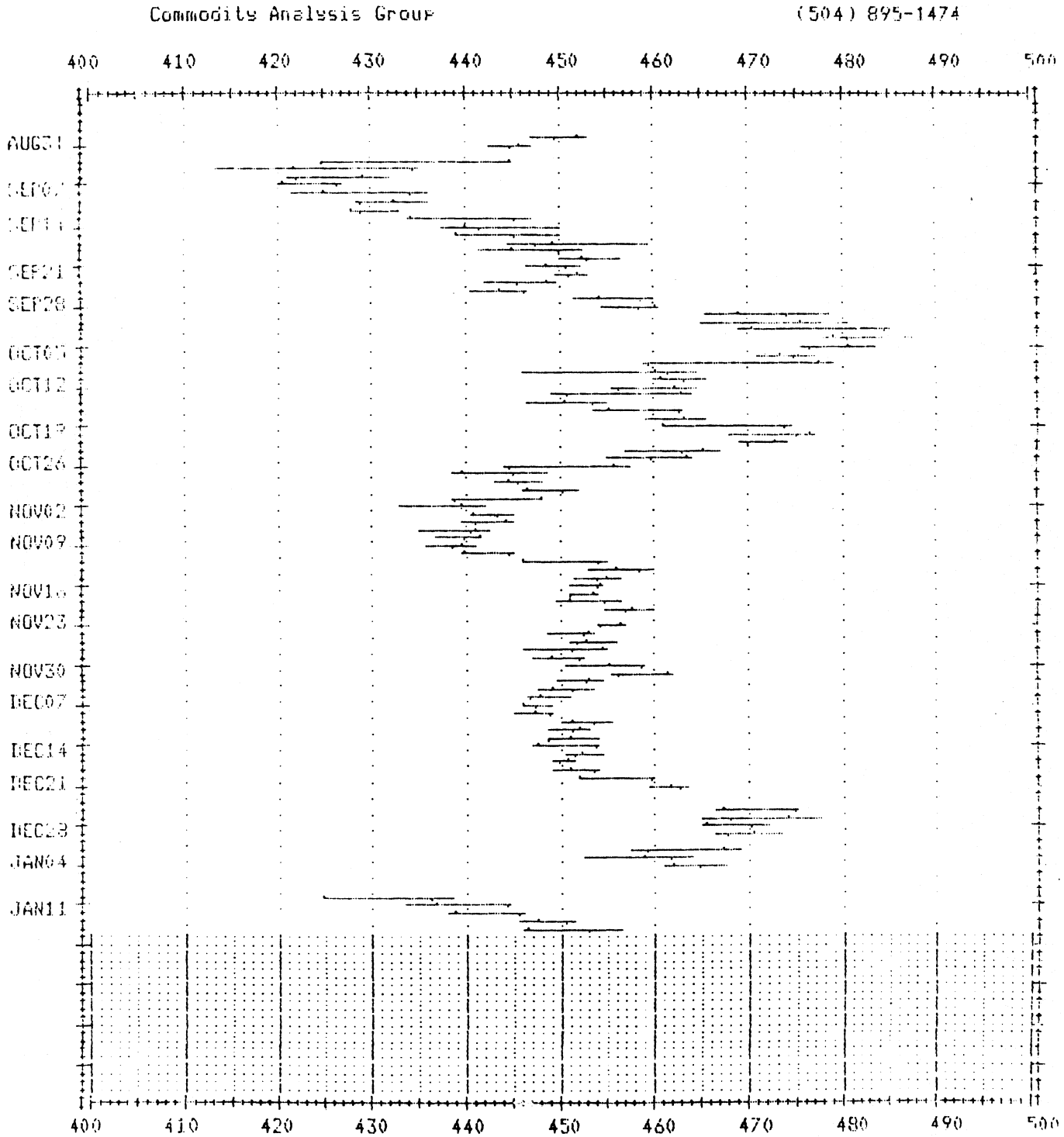


Drawn with COMPU TRAC Software

Analysis by JIM

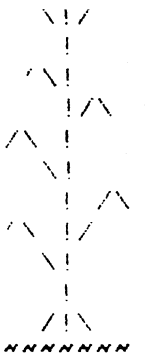
IT TOOK THE COMPUTER LESS THAN ONE MINUTE TO DRAW THIS PRECISION CHART.

WHEAT 07/80



Drawn with COMPU TRAC Software

Analysis by JIM



WILSDORF FARMS

Mark Wilsdorf
Rt. 1
Holliday, MO. 65258

December 7, 1981

Missouri Agriculture--SHOW-ME any better!

Mrs. Vera Landowner
123 Easy Life Drive
St. Louis, MO 65000

Dear Mrs. Landowner,

I am writing this to tell you that we have completed harvest on your farm. The soybeans were excellent this year, with an average yield of 42.7 bushels on your 235 acres.

Your checks from the elevator should be payment for 5017 bushels, in total amounting to over $31,000.00. If you do not receive payment in this amount, please send photocopies of the check stubs to me, and I will straighten out any errors with the elevator.

Your half of the combining amounts to $3525.00. You may pay me by mail or wait until you are in the area.

You should soon be receiving a bill in the amount of $1010.00 from Jefferson Stone Co., for liming of the 40 acre field west of the house.

As always, if you have any questions feel free to write or call. Otherwise, I will see you around Christmas time to discuss next year's rental contract.

Sincerely,

Mark Wilsdorf